

# ISGS Conference 2016

## Gesture, Creativity, Multimodality



## Book of abstracts

Keynote speakers.....	3
Special guest.....	9
Symposia.....	11
Talks.....	128
Posters .....	315

All sections but the symposia section are organised alphabetically, according to the name of the first author.

Symposia are organised alphabetically, according to the names of the symposia conveners. Within each symposium, abstracts are organised according to their order of presentation during the symposium.



# Keynote speakers

# Martha W. Alibali

University of Wisconsin – Madison, USA

## Toward an Integrated Framework for Gesture Production and Comprehension

In this talk, I draw on multiple lines of research to sketch an integrated framework for gesture production and gesture comprehension. The first part of the talk will focus on gesture production. I will present evidence that gestures derive from simulated actions and perceptual states. I will argue that these mental simulations and the corresponding gestures serve to schematize spatial and motoric features of objects and events, by focusing on some features and neglecting others. Further, I will argue that, because of its ability to schematize, gesture can affect thinking and speaking in specific ways. The second part of the talk will focus on gesture comprehension. I will argue that seeing others' gestures evokes simulations of actions and perceptual states in listeners. In turn, these simulations guide listeners to schematize objects and events in particular ways. These simulations may also give rise to gestures or actions. The third section of the talk will seek to bring production and comprehension together. I will argue that, with experience and via processes of statistical pattern detection, people develop expectations about when others are likely to produce gestures. These expectations guide people's attention to others' gestures at times when those gestures are likely to contribute to comprehension. Thus, gesture production and comprehension are linked, both because of their shared ties to the action system, and because gesture comprehension depends, in part, on patterns that arise due to regularities in gesture production.





# Alessandro Duranti

UCLA, USA

## Eyeing Each Other: Visual Access during Jazz Concerts

During jazz concerts it is expected that the members of small combos will take one or more “solos,” that is, turns at creating “on the spot” melodies, chord substitutions, or rhythmic patterns. The absence of a conductor and the expectation that what is being played is different from whatever is annotated on the page create a number of interactional problems that need to be resolved. I will focus on one problem: musicians need to know at any given time who is going to solo next or when the solos are ending and all the band members join in to play the melody one more time. A number of possible principles are made available by the history and culture of jazz including a sometimes explicit and other times implicit “hierarchy of players and instruments” (e.g., the band leader goes first; horn players go before rhythm section players like the pianist or the guitarist; the drummer takes one solo during each set). In most situations, however, the aesthetics of jazz improvisation leaves room for ambiguity about the identity of the next player and the length of each solo. As I will show, it is in these contexts that eye gaze and other gestures as well as body postures come to play an important role. But I will also argue that gestures and body postures can only be meaningful and effective against a shared understanding of where a transition point is possible.



# Scott Liddell

Gallaudet University, USA

Signers depict to such an extent that it is difficult to find a stretch of discourse without some type of depiction. Tokens are minimal depictions that take the form of invisible, isolated entities in the space within the signer's reach. Although invisible, tokens are conceptually present at those sites and signers can direct pronouns and indicating verbs toward them for referential purposes. Other invisible depictions include linear spatial paths that depict time. Buoys, a class of signs produced by the non-dominant hand, also depict entities, but buoys make the depictions visible. Theme buoys, fragment buoys, and list buoys also give a physical form to the entities associated with them. Surrogates are depictions of (typically) humans and may be visible or invisible. A visible surrogate takes the form of (part of) the signer's body and depicts actions and dialogue. Visible surrogates frequently interact with life-sized invisible surrogate people or entities. Another type of depiction involves shapes or topographical scenes, including actions within those scenes. Depicting verbs create and elaborate this type of depiction and will be the focus of this presentation. Depicting verbs comprise a very large category with unique lexical and functional properties. Their lexical uniqueness comes from their lack of a specified place of articulation, and for some, unspecified aspects of the hand's orientation. Their functional uniqueness comes from the requirement to produce every instance of a depicting verb within a spatial depiction. The depicting verb VEHICLE-BE-AT, for example, expresses the fixed, lexical meaning 'a vehicle is located on a surface'. But, a depicting verb never expresses only its lexical meaning. That meaning is always embedded within a depiction. Since VEHICLE-BE-AT has no lexically specified place of articulation, signers must provide one each time they use the verb. The place selected locates the vehicle within a topographical depiction and the orientation of the hand depicts the vehicle's orientation. Combining the lexical meaning with the depiction produces something like, 'A vehicle is located (right here in the depiction) on a surface (facing this way in the depiction)'. The combination of fixed lexical meaning and non-fixed, creative depiction produces a vastly enhanced meaning from a single depicting verb. Video examples from adults and children will illustrate the extent to which depicting verbs are used, the nature of what they depict, and the speed at which signers are able to shift between depictions.



# Cornelia Müller

European University Viadrina Frankfurt Oder, Germany

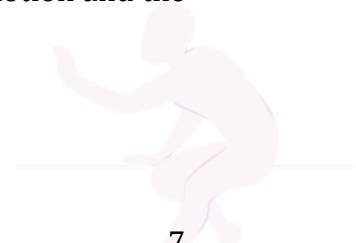
## Frames of Experience – The Embodied Meaning of Gestures

Addressing gestures as an embodied form of communication might appear somewhat tautological, while, in fact, most of the current debates in philosophy, linguistics, psychology, anthropology or the cognitive sciences more generally have not had much impact on theorizing the meaning of gestures in its specifics as a bodily mode of human expression (Streeck 2010 praxeological view is an important exception). My attempt to offer an embodied understanding of the meaning of gestures is related to Streeck's work but also informed by cognitive linguistic's perspective on the embodied grounds of meaning more generally. Philosopher Mark Johnson formulates this position in his book *The Meaning of the Body: An Aesthetics of Human Understanding*: "[...] meaning grows from our visceral connections to life and the bodily conditions of life. We are born into the world as creatures of the flesh, and it is through our bodily perceptions, movements, emotions, and feelings that meaning becomes possible and takes the form it does." (Johnson 2007: 17)

I am going to suggest that gestures are a primary field to study how meaning emerges from bodily experiences. Not only are they grounded in very specific forms of embodied experience, but, by studying gestures, we can actually learn something about how meaning and even some very basic linguistic structures may emerge from embodied frames of experience notably in conjunction with their interactive contexts-of-use. This take on gestural meaning includes referential as well as pragmatic gestures. Informed by the Aristotelian concept of mimesis as fundamental human capacity a systematics for an embodied cognitive-semantics and pragmatics of gestures will be presented. I will argue that the meaning of gestures referring both metaphorically and non-metaphorically is experientially grounded in different forms of bodily mimesis and that the same holds for pragmatic forms of gesturing (see also Zlatev 2014).

Putting the mimetic potential of gestures center-stage opens a systematic pathway to accounting for the meaning of a given gestural form. Gestural mimesis, however, never happens outside a given moment in a communicative interaction. The meaning of gestures, therefore always incorporates this specific contextual moment and this is what I refer to as frame of experience (Fillmore 1982). In conventionalization processes of co-speech gestures, we can witness sedimentations of the interplay between a motivated kinesic form and aspects of context that result in 'semantizations' of form clusters and kinesic patterns. Sometimes this involves the analytic singling out of a meaningful kinesic core with particular contextualized meanings as for example in the case of a group of gestures sharing a movement away from body.

The meaning of gestures thus emerges from embodied frames of experience, where embodiment involves both the sensory-motor experience of the body in motion and the specific intersubjective contextual embedding of this bodily experience.



# Catherine Pélachaud

CNRS, Télécom – ParisTech, France

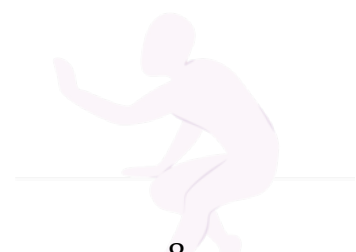
## Modeling conversational nonverbal behaviors for virtual characters

In this talk I will present our on-going effort to model virtual character with nonverbal capacities.

We have been developing Greta, an interactive Embodied Conversational Agent platform. It is endowed with socio-emotional and communicative behaviors. Through its behaviors, the agent can sustain a conversation as well as show various attitudes and levels of engagement.

The ECA is able to display a large variety of multimodal behaviors to convey communicative intentions. We rely on a lexicon that contains entries defined as multimodal signals temporally coordinated. At run time, the signals for given communicative intentions and emotions are instantiated and their animations realized. Communicative behaviors are not produced in isolation from one another. We have developed models that generate sequences of behaviors; that is behaviors are not instantiated individually but the surroundings behaviors are taken into account.

During this talk, I will first introduce how we build the lexicon of the virtual character using various methodologies, eg corpus annotation, user-centered design or motion capture data. The behaviors can be displayed with different qualities and intensities to simulate various communicative intentions and emotional states. I will also describe the multimodal behavior planner of the virtual agent platform.





*isgs7*

INTERNATIONAL SOCIETY  
FOR GESTURE STUDIES  
Paris, 18-22 July 2016

# Special guest

# Leonard Talmy

University at Buffalo

## Gestures as Cues to a Target

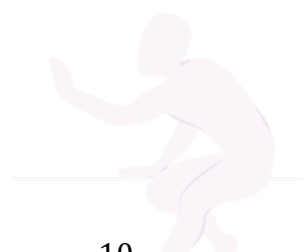
This talk examines one particular class of co-speech gestures: "targeting gestures". In the circumstance addressed here, a speaker wants to refer to something -- her "target" -- located near or far in the physical environment, and to get the hearer's attention on it jointly with her own at a certain point in her discourse. At that discourse point, she inserts a demonstrative such as this, that, here, there that refers to her target, and produces a targeting gesture. Such a gesture is defined by two criteria. 1) It is associated specifically with the demonstrative. 2) It must help the hearer single the target out from the rest of the environment. That is, it must provide a gestural cue to the target.

The main proposal here is that, on viewing a speaker's targeting gesture, a hearer cognitively generates an imaginal chain of fictive constructs that connect the gesture spatially with the target. Such an imaginal chain has the properties of being unbroken and directional (forming progressively from the gesture to the target). The fictive constructs that, in sequence, comprise the chain consist either of schematic (virtually geometric) structures, or of operations that move such structures -- or of both combined. Such fictive constructs include projections, sweeps, traces, trails, gap crossing, filler spread, and radial expansion.

Targeting gestures can in turn be divided into ten categories based on how the fictive chain from the gesture most helps a hearer determine the target. The fictive chain from the gesture can intersect with the target, enclose it, parallel it, co-progress with it, sweep through it, follow a non-straight path to it, present it, neighbor it, contact it, or affect it.

The prototype of targeting gestures is pointing, -- e.g., a speaker aiming her extended forefinger at her target while saying That's my horse. But the full range of such gestures is actually prodigious. This talk will present some of this range and place it within an analytic framework.

This analysis of targeting gestures will need to be assessed through experimental and videographic techniques. What is already apparent, though, is that it is largely consonant with certain evidence from the linguistic analysis of fictive motion and from the psychological analysis of visual perception.





# Symposia

# Lexical acquisition and Gesture across Bantu and Romance languages

Olga Capirci <sup>1</sup>, Jean-Marc Colletta <sup>2</sup>

<sup>1</sup> Consiglio Nazionale delle Ricerche - CNR (ITALY) (ISTC-CNR) – Via S. Martino della Battaglia 44, 00185 Roma (RM), Italy <sup>2</sup> Université Stendhal (Grenoble 3) – BP 25 38040 Grenoble Cedex, France

Within research on gestures in development only few studies have offered comparative data on early gestures of young children from different linguistic and cultural contexts. Recently some comparative studies have relied on an Italian picture-naming task (PiNG test; Bello et al., 2010, 2012) triggering children's spontaneous gesture production across a wide range of items (i.e. 40 pictures) to attempt effective comparisons across different languages and cultures (Pettenati et al., 2005; Stefanini et al. 2009). Therefore, researchers extended the use of this test to other populations to include children from Japan, Australia, Canada and Britain, while still relying on a common and structured tool for data collection (Pettenati et al., 2012; Hall et al., 2013; Marentette et al., 2015; Morgan, in press). However, comparative studies using the PiNG have only considered highly economically developed countries, while no study to date has considered child populations from Africa or from rural environments. These populations may differ their overall communicative style, also influencing their gesture production, as well as in their lexical development, which has been proven to be closely related to children's gesture production (Iverson et al., 1994; Özcaliskan & Goldin-Meadow, 2005). This panel is aimed at presenting new comparative data on using the PiNG task with children living in South Africa, France and Italy, considering for the first time both Bantu (i.e. Zulu and South Sotho) and Romance (i.e. French and Italian) languages. This data, from the broader GEST LA D project, was collected by a four collaborating international teams sharing tasks (i.e. adaptation of the PiNG for French and Bantu children), methods (i.e. the task was administered in comparable ways in very different cultural contexts), coding (i.e. same coding scheme for video analysis and same annotation software) and age groups (i.e. each partner considered 3 age groups, with a mean age of 24, 30 and 36 months respectively) to explore spontaneous gesture production.

The four contributions are:

- 1) R. Kunene Nicolas, S. Ahmed, N. Ntuli "Spontaneous gestures in lexical items of Zulu speaking children"
- 2) T. Nteso and H. Brookes "The use of representational gestures by South Sotho children aged 24 to 36 months"
- 3) J.-M. Colletta, A. Hadian Cefidekhanie, E. Jalilian "Morphological variation in early representational gesture"
- 4) H. Brookes, R. Kunene-Nicolas, O. Capirci, J.-M. Colletta, L. Sparaci, A. Hadian Cefidekhanie "Gesture productions across linguistic and cultural contexts"

Discussant: Virginia Volterra (ISTC- CNR, Rome) for her foundational work on the role of gestures in language development and on using the PiNG task to study children's gestures both within and across cultures.

Keywords: Early Gesture, Representational gesture, Bantu Language, Romance Language, Cross, cultural and cross, linguistic comparison, lexical acquisition





# Spontaneous gestures in lexical items of Zulu speaking children

Ramona Kunene-Nicolas, Saaliha Ahmed, Nonhlanhla Ntuli

The University of the Witwatersrand (WITS) – South Africa

Previous studies have shown that in children the lexicon is tightly linked to the development of categorization skills as well as the construction of meaning (Davidoff & Masterson, 1995; Gentner, 1982). Nouns and Predicates are characterized by differences in their perceptual and cognitive complexity. In cross-linguistic comparisons, several studies have illustrated the higher frequency of nouns rather than verbs in the first stages of language development (Goldfield, 2000; Caselli et al., 2007). However most languages that have informed this developmental trend tend to have never included the contribution of Bantu languages whose linguistic structure is agglutinative and has an intricate noun class system. To test this, we adapted the PiNG assessment of lexical comprehension and production (Bello et al., 2010) to the Bantu language Zulu. This tool allows the evaluation of children's repertoires in terms of nouns and predicate items as well to test the evolution of the lexical development in both speech and gesture.

36 monolingual and typically developing Zulu speaking children aged between 25 to 36 months (12 participants in groups of 25; 30; 36) and typically participated in this linguistic task and their spontaneous gestural productions were compared. Data was annotated on Elan, using a coding manual designed by the collaborators of the Gestland programme in order to compare lexical development across Bantu and Romance languages.

As reported in previous research, our findings showed that Zulu children had a high prevalence to noun items than predicate items, noun comprehension and production had a better performance than predicate comprehension and production. There was also an effect of culture as the test was adapted from an Italian assessment tool. Children produced spontaneous gestures in this naming task as in other languages. Children produced a high number of pointing gestures as well as some representational gestures. There was a higher production of gesture in the Predicate Production task than the Noun Production task, in line with previous findings that found children produced more gesture to describe actions (such as pushing/pulling, phoning). This paper examines the items that solicited the most referential gestures as well as the developmental trend.

Keywords: Lexical acquisition, representational gestural development, Bantu language



# The use of representational gestures in South Sotho children aged two to three years

Thato Nteso, Heather Brookes

University of Cape Town (UCT) – University of Cape Town Private Bag X3, Rondebosch, 7701, Cape Town, South Africa, South Africa

This study examines the use of gestures occurring during a picture comprehension and naming task among speakers of a Bantu language in South Africa. The comprehension and naming task (PiNG) was developed for Italian children (Bello et al 2012). For cross-cultural comparative purposes we did minimal adaptation only replacing four culturally unfamiliar items with the closest equivalent items familiar in the local context. Sixty-two South Sotho speaking children (age range between 24 and 36 months; 27 boys; 35 girls) divided into three age cohorts (24; 30; 36 months) identified (comprehension) and named (production) pictures designed to elicit nouns and predicates (actions and characteristics). Children produced conventional interactive gestures such as nods for 'yes' and shrugs for 'I don't know,' pointing, representational, pragmatic and word searching gestures. Nodding and pointing were the most frequent types of gesture followed by representational gestures. The frequency of representational gestures decreased from 25 to 36 months. Children used more representational gestures during speech production when they had to name nouns and predicates than during comprehension. Children produced more representational gestures when naming predicates than nouns. Predicate items that elicited the most representational gestures were 'pull,' laugh,' 'kiss,' 'phone,' 'wash,' 'open' and 'short/long.' Naming actions appears to elicit the most representational gestures. Children occasionally produced representational gestures as a substitute for speech. For example, the production of a size gesture for 'long' and 'far' substituting for speech, suggest that children also use representational gestures when struggling with verbal tasks. Noun production items that elicited the most representational gestures were 'heater' and 'gloves.' Most representational gestures involved children using their bodies to mimic the actions depicted in the pictures or actions relating to the picture. They also used their hands as objects during miming actions eg. Biting on the fist representing an apple or the flat hand dragged over hair for comb or the fist and arm used as a hammer. Children also used their hands to show size, distance and shape. Similar to previous findings in Italian children, representational gestures depicting actions were more frequent than size and shape gestures (Stefanini et al. 2009). Analysis of representational gestures across the three age cohorts show some changes in the way in which children represent objects, actions and concepts. For example, bi-handed asynchronous gestures were more common among three-year-olds than among two-year-olds. These results are discussed in relation to findings in other studies on children's gestural development.

Keywords: South Sotho, gesture development, representational gestures, lexical acquisition



## Morphological variation in early representational gestures

Jean-Marc Colletta, Ali Hadian Cefidekhanie, Elnaz Jalilian

Laboratoire de Linguistique et Didactique des Langues Etrangères et Maternelles (LIDILEM) – Université Grenoble 3 – France

Young children start to produce representational gestures as early as in their second year, either as substitutes for speech or combined with words (Capirci & Volterra, 2008). How children use representational gestures at early and later stages of language acquisition has been well investigated within the past decades (Acredolo & Goodwyn, 1988; Batista, 2012; Capone & McGregor, 2004; Colletta & Guidetti, 2010). In this study, we focus on the morphological features of early representational gestures and their variation between children. To explore this issue, the Italian PiNG test (Stefanini et al., 2009; Bello et al., 2012) was adapted to French. PiNG is a picture identification and denomination task that is used to assess early vocabulary in the child for both comprehension and production. As was shown in other studies (Pettenati et al. 2012; Pettenati, Stefanini & Volterra, 2009), a fair number of children spontaneously gesture during the task. In this study, we compared gestural performance between 36 monolingual and typically developing French speaking children aged 22 to 38 months. The video data was annotated under Elan, using a coding manual designed by all participants to the on-going Gestland programme (<http://gestland.eu>). The first results show that children produced a total number of 1104 gestures among which 714 points, 331 representational gestures, and 59 other gestures (i.e. emblems, pragmatic gestures, beats). Among referential gestures, the proportion of pointing gestures decreased with age whereas the proportion of representational gestures did not vary so much. Among the latter, some gestures were spontaneously produced by children during either the comprehension and production tasks or during intervals between two subtasks, other gestures were elicited by a question from the adult. Representational gestures the children spontaneously produced mostly referred to the target objects and actions. Some actions (e.g. 'to push', 'to wash hands', 'to phone', 'to drive', 'to laugh' ) and objects ('comb', 'umbrella', 'lion', ) activated more gesture production than others, therefore producing collections of comparable representational gestures. Additional collections were elicited by the adult such as the 'toothbrush' and the 'book'. The detailed analysis of their morphological features (handshape, movement, location) showed great variety that we will illustrate by examples in our presentation. Interestingly, changes in morphological features seem to be linked to both age and performance in the task. We provide tentative explanations based on the Jousian mimism framework (Jousse, 1974; Calbris, 2011) applied to early cognitive development.

Keywords: gesture, children, representation, variation, morphology



## Gesture production across linguistic and cultural contexts

Heather Brookes, Ramona Kunene-Nicolas, Olga Capirci, Jean-Marc Colletta, Laura Sparaci, Ali Hadian Cefidekhanie

University of Cape Town (UCT) – Private Bag X3, Rondebosch, 7701, Cape Town, Western Cape, South Africa

Recent work using the "Parole in Gioco" (PiNG) task devised in Italy (Pettenati et al., 2005) to evaluate vocabulary comprehension/production as well as gesture performance in 2-3 years old children has provided an opportunity to compare children's spontaneously produced gesture for a fixed set of targets across individuals, languages and cultures. Recently funded by ERA, the GEST LAN D programme adapted the PiNG task to French as well as to two Bantu languages (i.e. Zulu and South Sotho), first to develop a new psycholinguistic tool in the context of South Africa, second to explore aspects of representational gesture development at early stages of language development and third to investigate the effect of linguistic and cultural constraints on multimodal language production in comparing two Romance and two Bantu languages. Our goal was to examine the robustness as well as the similarities and differences of gesture use in early lexical acquisition across different linguistic/cultural contexts, using the Picture Naming Game (PiNG) as an assessment tool. The test was administered to 36 Italian, French, South Sotho and Zulu monolingual children aged 23 to 38 months making a total of 144 children. The analyses focused on the comparability of the type of gestures produced to a fixed set of pictures across linguistic and cultural contexts and on the role of the spontaneous production of gestures with respect to linguistic performance of children on the test. Across all four language groups, performance improved with age, however Bantu language speaking children performed at a slightly lower level than Romance language speaking children. We hypothesize that further adaptation to the cultural and linguistic context of South Sotho and Zulu children would enhance the performance of Bantu language speakers. Overall performance was better on comprehension than production and better on nouns than predicates across all language groups. Children in all four language groups gestured while performing both comprehension and production tasks. Pointing was the most common gesture type followed by representational gestures across all four language groups. The production of pointing and representational gestures decreased between 30 and 36 months. There was a negative correlation between spoken correctness and representational gestures. The more competent children become in speech, the less representational gestures they use across all four language groups. Further analysis will explicate the relationship between gesture and lexical acquisition and whether these trends are the same across different linguistic groups.

Keywords: development, lexical acquisition, representational gestures, cross, culture



# Using clinical research to shed light on gesture production in language and communication impairment

Caute Anna <sup>1</sup>, Andrea Dohmen <sup>2</sup>, Judith Kistner <sup>1</sup>, Abi Roper <sup>1</sup>

<sup>1</sup> City University London – Northampton Square, London EC1V 0HB, United Kingdom <sup>2</sup> University of Oxford – United Kingdom

Human communication relies on body movement, from general body movements necessary to explore new environments and manipulate objects, to more iconic movements of hands and fingers used in pointing and other gestures, to the exquisitely timed motor sequences of the articulators that support speech production. The theme of our symposium is to investigate connections between gesture production and language/communication impairment in children and adults with the goal of using these connections to further our understanding of atypical language/communication. This panel includes a series of presentations exploring relations between a range of different types of gesture production (namely co-speech gestures, imitation and pantomime) and language/communication skills among clinically referred participants with language and communication deficits. We present data from cross-sectional and longitudinal group and single-case studies. Research participants are drawn from English- and German-speaking populations and include children with language delay, adults with aphasia and their communication partners as well as healthy adult controls.

Two of the studies are theoretical, focussing on body movement imitation abilities as predictors of later language and communication impairments and the question of what gesture production can reveal about the breakdown of the mature language system in aphasia. Two, in contrast, are intervention studies, addressing computer-assisted therapy in a group of adults with aphasia and the communicative use of gestures in a single-case study of a person with severe aphasia and her communication partner.

Outcomes of our studies reveal interesting associations and dissociations between gesture and language/communication skills in children and adults with language /communication difficulties. Theoretically, findings can help to shed light on models of gesture and language processing. Clinically, findings have the potential to inform us about the use of gesture as a means to improve clinical diagnostic tools and intervention programmes for people with language/communication problems.

Keywords: Clinical gesture studies, atypical language/communication



# Gesture and posture imitation as predictors of later language and social communication outcomes

Andrea Dohmen

University of Oxford – United Kingdom

**Background** Some otherwise typically developing toddlers have delayed onset and progression of language and communication for no apparent reason. A considerable number of these children move into the typical range on standardised language measures during the preschool period, but a subset continues with language impairments throughout the school years (Rescorla & Dale, 2013). Clinically, it is important to identify children who are at risk of significant language and communication impairments when they get older, so that early intervention services can be directed to this subset. Over recent decades much research has focussed on detecting predictors of different language trajectories in children with late language emergence whereas there has been very little exploration of social communication trajectories in these children (Hawa & Spanoudis, 2014). Results have shown that prediction of language outcome is poor if reliance is only placed on expressive language measures, and the need for multifactorial predictive risk models that include a wide range of verbal and nonverbal factors has been highlighted (Desmerais et al., 2008). This longitudinal study was designed to investigate the predictive value and clinical significance of elicited posture and gesture imitation for later language and social communication outcome in Late Talkers.

## Methods

Participants were 38 German-speaking children who were identified as Late Talkers at 2-3 years and followed up at 4-5 years. Novel assessments of elicited body movement imitation (including different types of postures and gestures) were administered at Time 1, together with standardised language measures. At Time 2, children were assessed on standard language tests, together with parental reports of social communication.

## Results

Results show that early language skills at Time 1 were significantly associated with later language outcome at Time 2, and posture and gesture imitation skills at Time 1 with later social communication outcome at Time 2. Logistic regression analyses revealed that posture and gesture imitation as well as language at Time 1 added significantly to the prediction of language outcome at Time 2, whereas language skills at Time 1 did not add significantly to the prediction of social communication at Time 2.

## Discussion

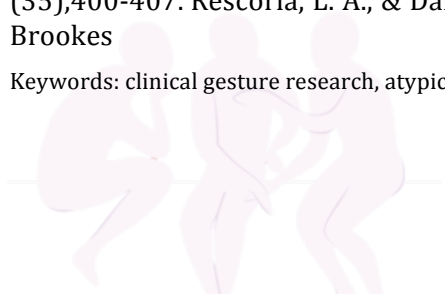
Findings are discussed in terms of clinical significance and implications for different sources.

## References

Desmarais, C., Sylvestre, A., Meyer, F., Bairati, I., & Rouleau, N. (2008). Systematic review of the literature on characteristics of late-talking toddlers. *International Journal of Language Communication Disorders*, 43, 361-389.

Hawa, V., & Spanoudis, G. (2014). Toddlers with delayed expressive language: an overview of the characteristics, risk factors and language outcomes. *Research in Developmental Disabilities*, (35), 400-407. Rescorla, L. A., & Dale, P.S. (2013). *Late Talkers*. Baltimore, London, Sydney, Paul Brookes

**Keywords:** clinical gesture research, atypical language/communication, Late Talkers, imitation





# The role of semantically rich gestures in conversation of people with aphasia

Judith Kistner, Jane Marshall, Lucy Dipper

City University London – Northampton Square, London EC1V 0HB, United Kingdom

**Background** Gestures are spontaneous hand and arm movements that frequently accompany speech and play an important role in everyday communication. Many gestures are semantically rich; for example, they reflect concrete or abstract references in the discourse (iconic, metaphoric, air writing & number gestures) or convey meaning in their own right (pantomime and emblem gestures). Other gestures are semantically empty; for example, including unspecified pointing (deictic) gestures or beat gestures that mark speech rhythm.

Because of the importance of gesture in communication, several studies have investigated the use gestures in aphasia (a language disorder due to brain damage). It is important to know how participants with aphasia (PWA) use gesture both as an accompaniment to speech and as a compensatory modality. Finding out more about the different roles of gestures in speech production in both impaired and healthy speech, helps us to better understand the relationship between language and gestures.

This novel study addresses the following research questions:

- (1) To what extent do PWA and neurologically healthy participants (NHP) employ semantically rich gestures?
- (2) Do different conversation topics (e.g., narrative and procedural) elicit different gesture patterns?
- (3) Do semantically rich gestures take different roles (e.g., supplement speech, compensate for speech or facilitate lexical retrieval) during conversation?
- (4) What impact does the semantic competence of PWA have on gesture production?

## Methods

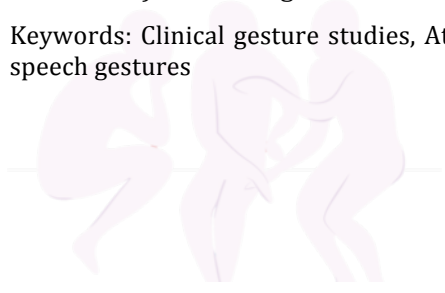
Language and conversation data of 20 PWA and 21 NHP have been collected. Video samples have been analysed for gesture production, speech production and word-finding difficulties. SRG and their roles have been contrasted with SEG.

## Results

Both groups used overall significantly more SRG than SEG. Furthermore, procedural topics elicited significantly more SRG than SEG in both participant groups. There was a significant effect of group for the different roles of gestures as well as an interaction between gesture roles and participant group. Surprisingly, there was no relationship between verbal and non-verbal semantic competence and the production of SRG in aphasia.

**Discussion** Results indicated that PWA and NHP differed in role of gestures but not in quantity. PWA and NHP produce a similar percentage of facilitative (facilitating lexical access) and compensatory gestures (replacing speech). While NHP predominantly used augmentative gestures (supplementing fluent speech), these were rarely used by PWA. PWA, however, produced a large number of communicative gestures (supplementing speech in word-finding difficulties) and asking the conversation partner for support.

**Keywords:** Clinical gesture studies, Atypical language/communication, Aphasia, Gesture production, Co, speech gestures



# Can people with severe aphasia benefit from computer-delivered gesture therapy?

Abi Roper, Jane Marshall, Stephanie Wilson

City University London – Northampton Square, London EC1V 0HB, United Kingdom

**Background** Individuals with severe language impairment due to aphasia can learn a communicative gesture vocabulary through one-to-one gesture therapy with a speech and language therapist (Rose et al, 2013). There is currently limited research however, which explores the effectiveness of computer practice as an extension to one-to-one gesture therapy. Within aphasia treatment, increased therapy intensity is associated with increased gains for spoken word naming ability (Bhogal et al, 2003) and computer therapy offers a cost-effective means of increasing therapy intensity without additional therapist demand (Varley, 2011). Recent advances in gesture recognition technology provide a platform for the development of responsive computer gesture therapy tools. The current study reports the effects of a novel, responsive, computer gesture therapy tool for 20 adults with severe aphasia. The study uses a wait-list control design.

## Methods

20 participants with severe chronic aphasia (mean age 67, mean time post-onset 59 months, mean performance on spoken picture naming subtest 1/24) received 5 weeks of computer-delivered gesture therapy, supported by weekly therapist input. During the intervention period, the computer therapy tool provided model examples of gesture and monitored users' repetitions for accuracy using a vision-based gesture recognition system. Repeated practice with the tool was promoted by the use of a game-like virtual environment and a variety of individual and 'real-world' video stimuli. Examples of gestures trained include child, walking stick and food. Outcome measures were administered at four time points, separated by five-week intervals (including pre and post- therapy assessments). Computer log data captured therapy practice time and system usage information. The primary outcome measure assessed gesture production from a picture. Videos of participants' gestures were shown to scorers blinded to the target item and time of assessment and scorers were asked to identify the item being gestured. Participants were awarded points for each item correctly identified. A secondary outcome measure assessed gesture production for a familiar communication partner. Participants were awarded points for each target item correctly identified by their partner.

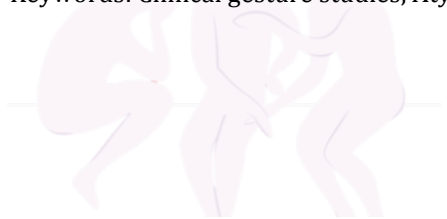
## Results

Participants practised for an average of 14 hours 22 minutes and completed an average of 50 practice sessions - suggesting a relatively intense practice schedule. Results from the primary outcome measure suggest a significant increase in the number of identifiable gestures produced after therapy. Data from the secondary outcome measure are currently being analysed and will be presented.

## Discussion

Outcomes suggest that participants with severe aphasia can achieve an intensive amount of autonomous gesture practice using a computer-supported gesture therapy. Results indicate that this promotes significant improvement in blinded measures of gesture. Further outcomes will reveal whether gains seen in blinded measures are also observed in the use of interactive gestures, as identified by a communication partner.

**Keywords:** Clinical gesture studies, Atypical language/communication, Aphasia, Gesture Recognition





# Therapy targeting the communicative use of gesture in severe aphasia: a single-case study

Caute Anna<sup>1</sup>, Jane Marshall<sup>1</sup>, Naomi Cocks<sup>2</sup>

<sup>1</sup>City University London – Northampton Square, London EC1V 0HB, United Kingdom <sup>2</sup>Curtin University – Kent Street, Bentley, Perth Western Australia. 6102, Australia

**Background** People with severe aphasia can benefit from therapy aiming to teach pantomime gestures as a compensatory strategy (Rose et al., 2013). However, few studies have explored whether these skills generalise to a communicative context.

This single-case study formed part of a group study comparing the benefits of gesture and naming therapy and examining the benefits of communicative therapy. Although research suggests that conversation therapy is only effective when both partners change their behaviour (Wilkinson & Wielaert, 2012), this was the first reported study of gesture therapy to address the communicative skills of both the person with aphasia and their main communication partner. We found participants made greater gains in naming than in gesture. They improved in their ability to convey messages and narratives following therapy for single items, with further gains in conveying messages following communicative therapy.

This single-case study builds on the group study by reporting the case of a participant whose pattern of performance differed from the group norm. It explores the success and limitations of communicative strategies employed by the dyad and describes in detail how therapy aimed to improve their communicative use of gesture.

## Method

"Mabel" was 87 and had severe aphasia following a left-sided CVA. She initially received 15-hours of therapy aiming to teach 20 pantomime gestures and 20 spoken words. She then received a further 15-hours of therapy aiming to improve her communicative use of gesture. In this second phase of therapy, individualised goals and strategies were developed. We targeted Mabel's use of gesture alongside other communicative strategies and her husband's ability to elicit and interpret her gestures.

The study used a repeated measures design with a double baseline and two post-therapy assessments. Outcome measures examined the intelligibility of individual pantomime gestures to an unfamiliar observer and the accuracy of spoken naming. Two novel assessments evaluated her ability to convey simple messages and narratives to her husband. All assessments included treated and untreated items.

## Results

Following the first phase of therapy, Mabel was still unable to produce any spoken words accurately. Visual analysis of the data suggests that there was an improvement in the intelligibility of her pantomime gestures that was not confined to treated items. However, there was no change in her ability to convey messages to her husband and her performance in conveying narratives was inconsistent. Following the second phase of therapy, Mabel's ability to convey messages improved. Her ability to convey narratives to her husband remained inconsistent.

## Discussion

Results indicate that Mabel learnt a small number of pantomime gestures following therapy targeting individual items. However, therapy specifically targeting the communicative use of gesture was required to provoke gains in conveying information to a partner.

**Keywords:** Clinical gesture studies, aphasia, atypical language/communication

# Aspect and gesture

Alan Cienki

VU University and Moscow State Linguistic University – Netherlands

This theme session engages the topic of the degree to which grammar is multimodal (e.g., Fricke 2012; Lapaire 2011; Mueller 2009) by examining how different kinds of event construal are expressed by speakers of different Indoeuropean languages lexically, grammatically, and/or gesturally. Linguistically, the starting point is different types of aspect and how they relate to gesture use. Previous research (Duncan 2002) showed that the duration of gesture strokes tends to be longer and more agitated with event descriptions in the progressive than in non-progressive verb forms in English and with verbs with imperfective rather than with perfective particles in Mandarin Chinese. (See also McNeill 2003 and Parrill et al. 2013.) This theme session continues this line of inquiry by considering aspect as it ranges from a grammatical category in some languages distinct from tense (perfective versus imperfective), to a category more bound to tense forms (perfect versus imperfect past tenses), to lexical aspect (Aktionsart). In terms of gesture, the focus in the session is on movement quality as analyzed in different ways, rather than on the traditional formal (form parameter) or functional categories frequently used in gesture analysis.

After brief opening comments, the panel begins with a talk on "Manner of motion and results as gesture in cut and break events: A multimodal grammatical analysis of Italian and Dutch Aktionsart in instrumental events", exploring how gestural movement relates to concomitant use of semantic aspectual distinctions expressed lexically in grammatical constructions. This is followed by three talks that highlight different parts of an international research project on aspect and gesture. The talk "Linguistic aspect and tense and gestural movement quality in French, German, and Russian utterances" provides an overview of the differences found between these three languages. The second talk, "Grammatical aspect and gesture in French: Reenacting past events" considers how the differential use of gestures with different past tenses in French can be described kinesiotologically in terms of different kinds of flow. The last talk, "Teasing apart factors related to the movement qualities of gestures used with different grammatical aspect forms in Russian" zooms in on the complexities of the results obtained from the one language in the project that, paradoxically, has the simplest (binary) distinction of grammatical aspect forms of the three languages studied. Various types of semantic criteria are revealed as crucial for interpreting the results obtained from the gesture analyses.

The panel will contribute to the broader debate about the relation of gesture to conceptualization and the degree to which that is shaped by linguistic categories in a given language or other semiotic principles, such as iconicity and schematization of visual-motoric patterns. It will provide a new perspective on the claim that gestures embody (features of) mentally simulated actions (Hostetter & Alibali 2008).

Keywords: aspect, Aktionsart, gesture movement quality



# Manner of motion and results as gesture in cut and break events: a multimodal grammatical analysis of Italian and Dutch Aktionsart in instrumental events

Paul Sambre<sup>1</sup>, Geert Brône<sup>2</sup>

<sup>1</sup>University of Leuven (Campus Antwerp) – Sint-Andriesstraat 2 B-2000 Antwerpen, Belgium <sup>2</sup>University of Leuven - Department of Linguistics – Belgium

This paper analyzes the multimodal expression of manner of motion and resultative end states in instrumental events (Rappaport Hovav & Levin 2010: 37-38). More specifically, we focus on multimodal "lexical aspect" (Filip 2012) in cutting and breaking events such as "met een slijpschijf snij je een tegel doormidden" (with a grinding disc you cut a tile in two (literally: in the middle)) or "usi la forchetta per rompere il ghiaccio" (you use a fork to break the ice). Much work in cognitive linguistics has insisted on the typological contrast between verb-framed Romance languages (e.g. Italian, Author 2013) and satellite-framed Germanic languages (e.g. Dutch), in thinking-for-speaking (Slobin et al. 2014) about events, typically causing low incidence of manner of motion (Cardini 2008) in Italian, due to different frequency and conceptual status of prepositions in verbal predicates (Cardini 2012). Our multimodal analysis takes this typological divide for instrumental events further, taking into account the mimetic interaction between verbal patterns and co-speech gesture (Duncan 2002, Cienki 2013) as a key to how instrumental events are iconically put into words and hands and multimodally synchronized (Cuxac & Sallandre 2007, Authors 2016). Our videocorpus consists of 10 x 2 pairs of native Flemish and Italian participants, which through photo-elicitation reflect on combinations of images for (a) cut-break instruments, as well as for (b) patient role of objects affected by such instrumental actions. While thinking of possible uses, manners and results in instrumental events, participants spontaneously produce co-speech gesture, integrating "analog-imagistic and categorial-linguistic semiosis" (McNeill et al. 2008: 120). We analyze the relation between generic (use, cut, break) verbs and specific expressive lexicalizations (Slobin et al. 2014) of cut- break actions in Italian (such as *distruggere* (demolish), *infrangere* (smash), *schacciare* (crush, crack), *affettare* (slice)) or Dutch (*kapotslaan* (break in pieces, literally: break damaged), in *scherven uiteenspatten* (scatter (literally: outside) in pieces of glass), in *sneetjes snijden* (cut into slices)). Both generic and specific verb constructions conceptually highlight additional lexical event features (Aktionsart) of instrumental actions such as manner of motion (intensity, directionality and orientation of path, duration and iteration) and resultative states (the effect of breaking and cutting on patients undergoing the action, typically expressed in separable verb prefixes or PPs). An interesting question is not only which manner and result materialize in two typologically distinct languages, but crucially, in which semiotic mode (speech or gesture) (Slobin 2006). Our claim is that a realistic account of grammatical constructions needs to chart and integrate the embodied, multimodal and conceptual complementarity (or incompatibility) of gestures and words in order to grasp speakers' understanding of which instrument is used for what goal and how it is used.

Keywords: Aktionsart, lexical aspect, instrumental events, Italian and Dutch, co, speech gesture, multimodal grammar



# Linguistic aspect and tense and gestural movement quality in French, German, and Russian utterances

Alan Cienki<sup>1</sup>, Aliyah Morgenstern<sup>2</sup>, Cornelia Müller<sup>3</sup>, Dominique Boutet<sup>4,5</sup>

<sup>1</sup>VU University and Moscow State Linguistic University – Netherlands <sup>2</sup>Université sorbonne nouvelle – Paris III – France <sup>3</sup>European University Viadrina – Germany <sup>4</sup>Centre de Linguistique Anthropologique et Sociolinguistique - Institut Marcel Mauss (LIAS - IMM) – Ecole des Hautes Etudes en Sciences Sociales (EHESS), CNRS : UMR8178 – 54 Boulevard Raspail 75006 Paris, France <sup>5</sup>Université d'Evry val d'Essonne– Boulevard François Mitterrand - 91025 Evry Cedex, France

The present project considers three languages with structural differences in expressing the temporal contour of events. To characterize events in the past, Russian has only one past tense form but two grammatical aspect forms (imperfective and perfective), whereas French and German each have a one-word 'imperfect' past tense (imparfait/Präteritum) and a compound 'perfect' tense (and other forms). Furthermore, Russian and German each employ morphological markings for different lexical aspects/Aktionsarten.

Linguists from various traditions (Croft 2012; Paul 1920; Sten 1952) have proposed that verbs in the perfect(ive) tense/aspect characterize events as bounded in some way, as opposed to those in the imperfect(ive), which either characterize them as unbounded or do not specify boundedness. Research dating back to Laban & Lawrence (1974/1947) has emphasized the distinction between movements involving a pulse of effort versus those that entail controlled exertion of effort. Building on Müller (1998), we define "boundedness" in gesture as involving a pulse of effort at the onset, offset, or medially in the gesture stroke, while unbounded gestures involve smooth, controlled motion. We hypothesize a correlation between the use of perfect(ive) tense/aspect forms and bounded gestural movements (event construal expressed in one go) versus imperfect(ive) tense/aspect forms and unbounded movements (focus on internal structure of the event).

Short personal narratives about events of different types were elicited from ten pairs of university students in Moscow (in Russian), Paris (in French), and Bochum (in German). Using ELAN, verbs referring to past events were coded for tense and aspect; any gestures overlapping in time with the utterance of these verbs were coded as bounded or unbounded. Coding by two annotators for each language of at least 50% of the gestures and resolution between them of differences provided a refined coding scheme for the remainder of the data.

The results for French confirmed the hypothesis: there was both significantly greater use of unbounded gestures with the imperfect tense and of bounded gestures with the *passé composé* (perfect) tense. For German, gestures with the perfect tense were also significantly more frequently bounded than unbounded, however gestures with the imperfect tense were evenly distributed between bounded and unbounded. The difference from gesture use with the comparable tense in French is accounted for in terms of the difference in semantic functions of the imperfect tenses in the two languages. For Russian, however, significantly more bounded than unbounded gestures were used with both perfective and imperfective verbs in the past. The difference from the results with the French and German tenses is accounted for in terms of the lexical semantic bases of grammatical aspects in Russian.

We will discuss how this analysis of gestural movement in relation to grammar provides a window onto speakers' dynamic construals of events.

This research, carried out at Moscow State Linguistic University, was supported by Russian Science Foundation Grant #14-48-00067.

Keywords: aspect, verb tense, grammar, French, German, Russian

## Grammatical Aspect and Gesture in French : reenacting past events

Aliyah Morgenstern<sup>1</sup>, Dominique Boutet<sup>2,3</sup>

<sup>1</sup>Langues, Textes, Arts et Cultures du Monde Anglophone (PRISMES) Université de la Sorbonne nouvelle - Paris III : EA4398 UFR du Monde Anglophone, 5 Rue de l'Ecole de Médecine, 75006 Paris - France <sup>2</sup>Centre de Linguistique Anthropologique et Sociolinguistique - Institut Marcel Mauss (LIAS - IMM) Ecole des Hautes Etudes en Sciences Sociales (EHESS), CNRS : UMR8178 54 Boulevard Raspail 75006 Paris - France <sup>3</sup>Université Evry Val d'Essonne (UEVE) Université Evry Val d'Essonne Boulevard François Mitterrand, 91000 Évry - France

A multimodal approach to the expression of past events in oral interactions can shed light on how we can incorporate gestural representations of the subjects' construal of event structure and correlate them with the verb forms used. Are the differences in the grammatical options that different languages provide for characterizing events also clear in the quality of the co-verbal gestures we use?

In order to tackle this issue, we analyzed the grammatical aspects, tense and time as well as gestures used by pairs of students as they related past events in the framework of the Polimod project directed by Alan Cienki. In this paper, we will focus on French and on the verbal forms in the imparfait, and passé composé with their associated gestures.

We transcribed the data in ELAN and annotated it using the coding scheme for aspect, time and tense and the boundary schemas developed in the project (Müller, 2000) differentiating what we called “bounded” and “unbounded” gestures.

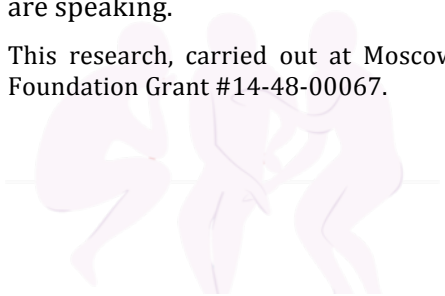
We then developed a more specific coding system to make finer grain analyses of the speakers' co-verbal gestures. Rather than using the form features common in gesture research (McNeill 1992), our study is based on a physiologically-based kinesiological system (Boutet 2010). Our allocentric approach accounts for gesture units not in terms of their iconicity, but based on their formal characteristics and physiological constraints, which we call degrees of freedom. We coded the flow of the movement, the number of segments involved (fingers, hand, arm, forearm...), the configuration of the gesture and velocity.

The results of the coding of the boundary schemas in the French data confirmed our hypothesis: there was a significant correlation between bounded gestures and the perfect tense (passé composé) as well as between unbounded gestures with the imperfect tense (imparfait). The aspectual difference between passé composé and imparfait seems to be embodied in the quality of the gestures used.

Our first qualitative results using the detailed kinesiological coding system on 15% of the data indicates that the main feature that seems to differentiate the gestures associated to the imparfait to those associated to the passé composé is the flow of the movement. For the imparfait over 60% of the gestures are characterized by a proximal-distal flow (from the arm down to the fingers). Conversely, the gestures associated to the passé composé are distal-proximal (from the fingers up to the shoulder) in 80% of cases.

This difference could be viewed as an embodiment of the link between imparfait and “ground” versus passé composé and “figure” (Langacker, 2001) and illustrates how research on speakers' gestures can provide ways of studying their conceptualization of grammatical notions as they are speaking.

This research, carried out at Moscow State Linguistic University, was supported by Russian Science Foundation Grant #14-48-00067.





# Teasing apart factors related to the movement qualities of gestures used with different grammatical aspect forms in Russian

Valeriia Denisova<sup>1,2</sup>, Olga Iriskhanova<sup>1</sup>

<sup>1</sup> Moscow State Linguistic University (MSLU) – 119034, Ostozhenka st., Moscow, Russia, Russia <sup>2</sup> VU University Amsterdam (VU Amsterdam) – Main building VU University Amsterdam De Boelelaan 1105 1081 HV Amsterdam The Netherlands, Netherlands

Previous research (e.g., Duncan 2002; Parrill et al. 2013) has indicated a connection between grammatical aspect (e.g., in English and Mandarin Chinese) and features of gestures, such as their movement quality or the temporal length of their stroke phase. In Russian, like in many Slavic languages, there are two aspect forms for verbs used in the past tense or future tense, namely imperfective and perfective. Traditionally, the perfective is analyzed in Russian as viewing an event as a whole, and the imperfective as not specifying this (e.g., Comrie 1976; Jakobson 1971). In line with the theory of gesture and speech arising from the same growth points (McNeill 1992), our hypothesis was that gestures accompanying events characterized verbally with the perfective aspect would more likely involve a pulse of movement effort, correlating with the characterization of an event as a whole, and gestures used with imperfective verbs would involve more continuous effortful control, correlating with a focus on construal of the internal constituency of the narrated event.

We analyzed conversational personal narratives elicited from ten pairs of university students in Moscow (native speakers of Russian). The average length of the conversations was ten minutes. We focused on verbs referring to events in the past, coding verbs for their aspectual form. Only gestures whose preparation, stroke, or retraction overlapped in time with the utterance of such a verb were annotated. These were coded using a set of "boundary schema" categories, building on Müller (1998), with bounded gestures involving a pulse of effort in the movement of the stroke, and unbounded gestures lacking such a pulse and instead involving a controlled distribution of effort. Bounded gestures include onset-bounded (pulse at the beginning), punctual (medial pulse), and offset-bounded (with acceleration at the end); unbounded include simple (smooth motion) and iterative (smooth repetition) types.

Initial results from seven of the videos show both imperfective and perfective forms being used with significantly more bounded than unbounded gestures. The distribution across the two aspect forms is nearly the same (61% bounded/39% unbounded for perfective, N=189; 62% bounded/38% unbounded for imperfective, N=261). The results were further analyzed from the point of view of the type of event described, the type of verb (full, auxiliary, copula), event structures (compound or simple), and the interrelations between events.

The findings support the view of many Russian scholars that aspect is not a simply binary grammatical category, but rather is a complex notion closely connected with the semantics of verbs (Bondarko 1984 ;Maslov; 2004;Plungian 2000).Not only is linguistic aspect in Russian a family- resemblance category, in the sense of Wittgenstein(1953), but the gestures used with each aspect type are also motivated by a family of factors related to linguistic co-expression, semantics, and types of construal.

This research, carried out at Moscow State Linguistic University, was supported by Russian Science Foundation Grant #14-48-00067.

Keywords: co, speech gesture, aspect, multimodality, cognitive linguistics



# The role of facial expressions in signed and spoken conversations

Connie De Vos<sup>1,2</sup>

<sup>1</sup> Max Planck Institute for Psycholinguistics – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands <sup>2</sup> Radboud University (RU) – Netherlands

Symposium: The role of facial expressions in signed and spoken conversations Face-to-face interaction is the core ecological niche for language: interaction is the point of origin for language emergence, acquisition, and evolution. To understand the linguistic capabilities of our species it is necessary to analyse language in interactive contexts. Linguistic analyses increasingly focus on multi-modal interaction, but one crucial aspect of face-to-face conversation has so far remained largely unexplored: the face itself.

This panel addresses how facial expressions are recruited to enable smooth conversational turn-taking during face-to-face interaction, including facial cues that signal turn boundaries and that themselves make minimal and non-minimal communicative moves (e.g., continuers, repair initiation, questions). The studies presented draw on a rich base of empirical methods, including psycholinguistic experimentation, quantitative corpus study, and microanalysis of conversational contingencies, to study the relevance of facial expression to signers and speakers in interaction in both cross-linguistic (talks 1 and 2) and cross-modal (talks 3 and 4) contexts.

Prof. W. Sandler has kindly agreed to participate in the symposium as a discussant. She is particularly well-suited to do so given her expertise in facial intonation in signed languages as well as her theoretical interest in the transition from gesture to language in sign language emergence.

## Symposium outline

5 min Opening remarks by symposium organiser

25 min Talk 1 Comparative feedback: Cultural shaping of response systems in interaction

25 min Talk 2 Blinking as addressee feedback in face-to-face conversation?

25 min Talk 3 Gaze as a resource for grammar and interaction

25 min Talk 4 The role of facial expressions in the anticipation of turn-ends

10 min Discussion by Wendy Sandler 5 min Closing remarks by symposium organiser

Keywords: facial expressions, multi, modal interaction, conversation, eyegaze, blinks, sign language



# Comparative feedback: Cultural shaping of response systems in interaction

Stephen Levinson<sup>1,2</sup>, Penelope Brown<sup>1</sup>

<sup>1</sup> Max Planck Institute for Psycholinguistics (MPI) – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands <sup>2</sup> Radboud University (RU) – Netherlands

There is some evidence that systems of minimal response ('feedback', 'back-channel', 'reactive tokens') may vary systematically across speakers of different languages and cultural backgrounds (e.g., Maynard, 1986; Clancy et al., 1996). The questions we address here are these: what is the nature of such differences? And what difference do they make to how do these differences affect the interactional system as a whole? We explore these questions by looking in detail at conversational data from two languages and cultures: Y'el'ŋ Dnye, spoken on Rossel Island (Papua New Guinea), and Tzeltal Mayan, spoken in southern Mexico. The Rossel system is gaze-based, interlocutors tend to maintain a high level of mutual gaze, and a large proportion of feedback signals – many nonverbal – occur during the production of the turn that is being reacted to. Tzeltal speakers, in contrast, practice gaze avoidance, and produce very few visual feedback signals, but instead relying on frequent verbal response signals at the end of each TCU, and an elaborate convention of repeating (parts of) the prior turn to display understanding and agreement. We outline the repertoire of response tokens for each language, illustrate their differential usage, and suggest some consequences of these properties of turn-taking systems for interactional style and for on-line processing.

Keywords: backchannelling, feedback





# Blinking as addressee feedback in face-to-face conversation

Paul Hömke<sup>1</sup>, Judith Holler<sup>1</sup>, Stephen Levinson<sup>1,2</sup>

<sup>1</sup>Max Planck Institute for Psycholinguistics (MPI) – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands <sup>2</sup>Radboud University (RU) – Netherlands

In face-to-face conversation, recurring intervals of mutual gaze allow addressees to use their heads and faces to provide speakers with visual feedback (e.g., nod; smile), replacing or complementing vocal feedback (e.g., hm-hm; Yngve, 1970). Blinking occurs ubiquitously in conversation but its feedback function has hardly been explored. Previous research suggests that in addition to physiological, perceptual, and cognitive functions, blinking may also serve a communicative function. For example, it has been shown that in American Sign Language, addressee blinking is used to signal understanding (Sultan, 2004). Sultan suggested that blinking might have developed a feedback function in signed languages because of their strong reliance on visual information and a need to control blinking to minimize information loss. However, addressee blinking as a signal of understanding has also been described in Y'el'ı Dnye, a spoken language of Papua New Guinea (Brown & Levinson, 2004). In the present study, we hypothesized that addressee blinking may have a similar function in spoken Dutch, because at least in face-to-face contexts it also relies heavily on visual information. If this hypothesis was true, one should expect addressee blinks to be timed to speakers' talk at similar points in time as other backchannels, namely at the ends of speakers' syntactically, prosodically, and pragmatically complete turn units (e.g., Selting, 2000; Gardner, 2001). Alternatively, if addressee blinks do not fulfill a feedback function in spoken conversation, one should expect them to be randomly distributed across turns and irrespectively of the communicative context. To address this question, we analyzed the timing, blink duration, multimodal compositionality, and sequential placement of addressees' blinks during turns by another speaker. Blinks were identified semi-automatically from a video-corpus of 10 dyadic informal Dutch conversations. Due to postulated differences in the communicative salience of blinks based on their duration, we categorized blinks into "short" and "long" blinks, splitting them at the upper quartile (410 ms, see also Hermann, 2010, and Cummins, 2012). We then measured their occurrence with respect to the end of speakers' turn units, the location where addressee feedback is typically produced. Our quantitative analyses revealed that the majority of short and long addressee blinks were timed like other types of addressee feedback, namely, close to the end of speakers' turn units. Compared to short blinks, long blinks were less frequent and were more likely to co-occur with head nods or vocal feedback. Further qualitative analyses revealed that addressees used long blinks to signal understanding, especially in response to speakers' self-repairs. In addition to physiological, potential perceptual and cognitive functions, our findings suggest that addressee blinks, especially long ones, are used as a social feedback signal of understanding in human spoken interaction.

Keywords: Conversation, addressee feedback, eye blinking



## Gaze as a resource for grammar and interaction

Simone Girard <sup>1,2</sup>, Sandra Sidler-Miserez <sup>3</sup>, Katja Tissi <sup>3</sup>

<sup>1</sup> University for Applied Sciences for Special Needs Education, Zurich – Switzerland <sup>2</sup> University of Neuchâtel – Switzerland <sup>3</sup> University of Applied Sciences of Special Needs Education, Zurich – Switzerland

Previous studies on signed languages have shown that signers' gaze direction is influenced by factors at both grammatical and interactional levels of language use. On the one hand, looking away from addressees seems to be part of at least some types of depicting signs, i.e. semi-conventionalized signs that visually show a meaning rather than designate it (Cuxac, 2000). On the other hand, looking at the interlocutor is crucial in monitoring mutual attention and understanding (e.g., Baker, 1977). Specifically, signers are reported to gaze at their addressees at the beginning of short and/or interrogative turns, as well as at the end of turns to yielding the floor to a next signer (Baker, 1977; Martinez, 1995). The question therefore arises whether there is evidence of conflicting requirements on signers' choices with gaze direction for either grammar or interaction, e.g. when a depicting sign is used at the beginning of a short turn. If such cases occur, how do participants solve the conflicting requirements? In this presentation we approach this question on the basis of a small corpus of prompted and naturally-occurring interaction among four acquainted signers of Swiss German Sign Language (DSGS), as well as retellings of short films that each of these signers directed to their addressees. The data was filmed with three cameras and annotated with iLex (Hanke, 2002) for manual components and gaze direction.

We report on initial analyses, describing to what extent our DSGS data supports the literature on gaze direction with respect to depicting signs as well as turn boundaries. The data reveal that, unlike previously reported (cf. Cuxac, 2000), depicting signs do not systematically occur with the signer's gaze directed away from the interlocutors, especially when the sign was already used earlier or when the signs occurred in sequences where aspects of the same situation are represented differently by multiple depicting signs. Moreover, with respect to turn boundaries, it appears that gaze at turn-endings is not necessarily oriented towards the addressee, but rather depends on other contingencies of interaction such as the projectional strength of the turn (i.e. whether the turn puts a high or low constraint on what type of responsive turn is expected), gaze conduct of addressees, and potential closing of the sequence (cf. Rossano et al., 2009; Girard-Groeber, 2015). On the basis of these insights, the current analysis investigates to what extent interactional tasks, such as checking for understanding, can explain why signers look at their interlocutors during depicting signs.

By bringing micro-sequential multimodal analysis into play, we argue that, while tendencies can be described on the basis of a quantitative analysis of interactional data, a local micro-sequential analysis is necessary to accurately demonstrate how participants use gaze within the contingencies of interaction.

Keywords: sign language, interaction, gaze conduct, depicting signs



# The role of facial expressions in the anticipation of turn-ends

Connie De Vos<sup>1</sup>, Marisa Casillas<sup>1</sup>, Onno Crasborn<sup>2</sup>, Stephen Levinson

<sup>1</sup> Max Planck Institute for Psycholinguistics – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands <sup>2</sup> Radboud University (RU) – Netherlands

Across the world's languages, interlocutors in spontaneous conversation time their utterances to minimise gaps and overlaps between consecutive turns, resulting in remarkably fast turn-transitions (mode = 200ms; Stivers et al. 2009). Recent analyses indicate that the same turn-timing pattern extends to signed languages, provided that signers consider the end of the turn-final stroke (i.e. the end of the lexically-specified movement of signs) as the end of the turn itself (Sacks et al. 1974; Kita et al. 1998). Following this, addressees in signed conversation must anticipate current signers' upcoming turn-ends to plan and initiate their responses with minimal-gap-minimal-overlap timing (similar to spoken conversation; Sacks et al. 1974; De Ruiter et al. 2006). We tested whether signers could anticipate the ends of turn-final strokes by adapting a turn-end prediction measure originally designed for spoken language. 52 deaf signers of NGT (Nederlandse Gebarentaal, Sign Language of the Netherlands) watched 80 short conversational video sequences. Each sequence contained a few seconds of context followed by a target turn, segmented from spontaneous NGT conversation (Example: <http://hdl.handle.net/1839/00-0000-0000-0020-6C0D-C@view>). Participants watched the context and then, when one signer disappeared, focused on the remaining signer and tried to press the button at the moment they anticipated the turn would end. Initial analyses indicated that NGT signers predict the end of turn-final strokes in NGT with accuracy comparable to Dutch speakers' predictions about turn-ends in Dutch (De Ruiter et al. 2006). Interestingly, turn-end prediction was earlier for questions than for non-questions. We now discuss the role of linguistic cues driving signers' early responses for questions.

We annotated each stimulus for a variety of facial and manual cues that might help signers predict turn-ends, using a combination of native signer intuition and Ekman's (1979) Action Units (AU). As previously reported, NGT content questions were often marked out by furrowed brows, and polar questions by brow raises (Coerts 1992). Brow movements were more frequent in questions (78.4%) compared to non-questions (23.2%). While AU1+2+4 was uniquely associated with questions, AU1+2 was found in both questions (35%) and non-questions (59%), presumably because AU1+2 is also associated with topic marking and conditionals (Coerts 1992). A linear mixed effects model fit to participants' button press latencies confirmed that questions with AU1+2+4 were anticipated to end earlier than questions with AU1+2.

Surprisingly, lexical cues to questionhood were weaker in our stimuli. Only 9.8% of questions included explicit question words. Meanwhile, 43.1% of questions included second-person references to the addressee ("you (guys)") – prototypically used when the speaker is asking the addressee something. Only 7.2% of non-questions used second-person references. In sum, our findings suggest that, in addition to lexical cues, facial cues play a clear role in turn boundary prediction in signed conversation.

Keywords: brows, facial intonation, prosody, sign language, conversation



# Embodied practices in instructional settings

Arnulf Deppermann<sup>1</sup>, Elwys De Stefani<sup>2</sup>

<sup>1</sup>Institut fuer Deutsche Sprache (IDS) – Institut fuer Deutsche Sprache PF 101621 D-68016 Mannheim, Germany <sup>2</sup>KULeuven – Belgium

Embodied practices achieved through gesture, manipulation of objects, etc., are key resources of action-formation in instructional settings. In instructions, gestures may be used in different ways: Pointing to objects and landmarks directs recipients' attention and establishes reference (cf. Goodwin 2003), whereas iconic and metaphorical gestures project formal properties of objects and demonstrate actions to be performed (cf. Streeck 2009a), thus fostering and sometimes even enabling recipients' understanding. Gestures and other multimodal resources are coordinated in a precision-timed manner. Gestures have typically been described as preceding corresponding verbal actions, and thus as projecting referents and actions early (Streeck 2009b), thereby allowing for smooth interactional cooperation. Still, the comprehension of gestural practices in instructions requires a specific, professional vision (Goodwin 1995) of the participants: They have to use professional knowledge about how objects and visual properties of the site matter to the activity at hand and how these are to be identified and to be interpreted.

The panel invites studies on how participants use gestures in the accomplishment of instructions and on how these are adapted to the instructional business at hand. It welcomes papers on traditional environments of instruction (e.g. classroom interaction), but also on less studies instructional settings or on instructional episodes that may occur in other sites of natural interaction. Major emphasis is put on the temporal, spatial and intersubjective characteristics of gestural practices in instructional episodes. The analyses should be based on empirical data and highlight the interactional dimension of gesture usage. Leading questions for the papers in the panel are:

- How are gestures coordinated with other multimodal resources, both temporally and interpersonally? When do gestures accompany speech and how and when may gestures substitute speech?
- How are gestures tailored to the specific spatio-temporal ecology of the instructional setting, its restrictions and affordances (e.g., the spatial line-up of the participants, restrictions on visibility, movement and speed of relevant objects)?
- How do gestures contribute to intersubjective coordination and understanding in instructional episodes?
- How is the use of gestures tied to professional (or other) stocks of knowledge and to professional vision?

The findings emerging from the papers presented in this panel will provide better understanding into how gestures are used in instructional settings or episodes and how they are coordinated with concurrent actions.

Papers in the symposium:

Pointing in a mobile setting of instructional interaction: Driving lessons

The embodied and sequential organization of correction in basketball practice

Clients' instructions and hairdressers' elaborations in hair salon interaction: The client's head as a manually explorable 'working space'

How, when and where – deictic practices in self-defense trainings

Keywords: instructions, multimodal interaction, conversation analysis, embodied practices

# Pointing in a mobile setting of instructional interaction: Driving lessons

Arnulf Deppermann<sup>1</sup>, Elwys De Stefani<sup>2</sup>

<sup>1</sup>Institut fuer Deutsche Sprache (IDS) – Institut fuer Deutsche Sprache PF 101621 D-68016 Mannheim, Germany <sup>2</sup>KU Leuven – Faculteit Letteren Department of Linguistics Blijde Inkomststraat 21, bus 3308 3000 Leuven, Belgium

Pointing gestures have been described as a prototypical occurrence of deixis (Bühler 1934) emanating from an origo that is fundamentally egocentric and stationary. This contribution understands reference as interactively accomplished (Hanks 1992) and looks at referential practices in a setting of interaction that provides three potentially problematic features for the performance and visibility of pointing gestures. Firstly, driving lessons occur on the move, hence participants constantly modify their position (distance and direction) with respect to the reference point of a pointing gesture. Secondly, the student driver and the instructor are positioned in a side-by-side arrangement (Kendon 1990) rather than in a canonical face-to-face position, hence gestures have to be maximally embodied in order to secure recognisability. Thirdly, participants are engaged in multiple activities (driving, talking, etc.) and in diverse participation frameworks (interaction between driver and instructor, interaction among road users) requiring visual orientation towards the traffic situation.

We examine how participants adjust their gestures to these three features of the setting. In our data, we observe the following practices:

- When student drivers orient their gaze to the road ahead, instructors may maximise the witnessability of pointing gestures by carrying them out in the student driver's visual field;
- if reference points are located outside the visual field of the driver, the instructor may choose to produce hearable rather than seeable indications (e.g. by tapping on the right window when directing the driver to turn right);
- instructors can provide spatial indications through talk, using categorical lexical reference or formulating the action they expect the driver to carry out. We first analyse the different interactional, spatial and temporal contingencies of driving lessons which constrain and inform the use of referential resources. We subsequently examine if and how participants' practices orient to these situational contingencies. Hence, we contribute to better understanding how a massively used resource in driving school lessons – the pointing gesture – is designed in ways which is sensitive to environmental and sequential features of the interaction at hand. In consequence, this study feeds into recent research on multimodality (Deppermann 2013), mobility (Haddington, Mondada & Nevile 2013) and deixis (Stukenbrock 2015) from an interactional perspective.

Keywords: multimodal interaction, conversation analysis, pointing, driving, deixis



# The embodied and sequential organization of correction in basketball practice

Bryn Evans<sup>1</sup>, Oskar Lindwall<sup>2</sup>

<sup>1</sup> Auckland University of Technology – New Zealand <sup>2</sup> University of Gothenburg – Sweden

Playing basketball is an embodied joint activity in which players must coordinate their actions with those of multiple teammates, as well as opponents, all while attending to the spatial structure of the basketball court and relevant material objects such as the basketball and the basket. In settings of basketball team coaching, the competent accomplishment of joint trajectories of embodied action becomes an explicit focus of pedagogical attention. Through the coach's interventions into their activities, players are enabled to see, feel, and respond appropriately to relevant features in the environment. This presentation illustrates some of the embodied practices through which instructional corrections are accomplished during basketball team practice sessions. Using video-based data of correction sequences occurring during training drills, the analysis explores how gesture is interwoven with talk in the process of defining player errors (in order to make the errors visible to all players and available for correction work) and in the accomplishment of the correction itself. The analysis explicates further how gestures are produced in ways highly sensitive to features of the spatial ecology, including players' bodies, court markings and the location of the ball. Finally, the study explores different interactional tasks that gestures are used to accomplish including the establishment of joint attention, the reenactment and demonstration of player conduct, and the physical repositioning of players into relevant spatial locations and embodied postures. We argue that gestures in basketball instruction are precisely temporally and spatially organized, produced in unfolding correction sequences that involve embodied contributions from both coach and players, and offer crucial resources in resolving local problems arising from the interactional organization of basketball drills and the instructional requirements of the setting.

Keywords: Instruction, Correction, Basketball, Multimodality, Ethnomethodology, Conversation Analysis





# Clients' instructions and hairdressers' elaborations in hair salon interaction: The client's head as a manually explorable 'working space'

Anne-Sylvie Horlacher

University of Basel – Französisches Seminar, Maiengasse 51, 4056 Basel, Switzerland

Haircut negotiations are integral to client-hairdresser's interactions at the salon (Oshima 2009; Jacobs-Huey 2006). It is during the initial phase of the encounter that hairdressers and clients collaboratively delineate the haircut in prospect. Hairdressers ordinarily initiate this phase by saying *alors tu: m'expliques un peu comment tu veux que j' te coupe les ch'veux cette fois?* ('so you explain to me a little bit how you want me to cut your hair this time?'), *alo:rs monsieur [...]* *qu'est-ce que j' dois y faire?* ('okay Sir [...] what am I supposed to do?') or *les ch'veux on les fait assez courts ou pas trop?* ('we cut the hair quite short or not that much?'). Clients systematically respond by providing more or less detailed instructions on how the hairdresser is expected to cut or style the hair. These instructions are achieved through talk and gesture, especially by pointing to the head and touching the hair. However, in hair salons, clients' instructions are habitually assessed, commented, revised by the hairdresser. Again, hairdressers accomplish these actions not only through talk, but also by pointing to the clients' head, running their fingers through the clients' hair, manipulating tools and, on occasion, by mobilizing hair picture books. This contribution explores one recurrent problem in the consultation phase, i.e. the ways in which clients instruct the hairdresser about how long s/he should cut the hair. It analyzes more specifically how the client's initial instruction is collaboratively transformed through talk and by manually exploring the client's head. This recurrent practice, where both participants display their different kinds of expertise, is paramount for achieving a consensus: The client's head becomes a 'working space' for creativity and decision-making, whereby both the client and the hairdresser take turns in accessing that working space manually. Furthermore, instructions about the length of the hair are observable in subsequent phases of the encounter. At these stages of the encounter, they take the form of corrective instructions: *(vous) coupez quand (m'eme) pas tro:p hein* ('(you) don't cut too much huh'), *tu coupes pas beaucoup hein* ('you don't cut much huh'). This paper uses conversation analysis (Sacks, Schegloff & Jefferson 1974) and multimodal interaction analysis (Streeck, Goodwin & LeBaron 2011) as methods of investigation and the analysis is based on video recordings collected in a hair salon located in the French speaking part of Switzerland (18 clients, 6 hairdressers). It contributes to the growing body of research investigating instructions in diverse settings of interaction (De Stefani & Gazin 2014; Deppermann 2015; Lindwall, Lymer & Greiffenhagen 2015) and offers both a detailed description of instructional episodes in hair salon interaction and a discussion of the notion of 'instruction' that is currently used in various acceptations.

Keywords: hairdressing, French, instruction, gestures, touch, creativity, professional expertise, conversation analysis, multimodality



# How, when and where - deictic practices in self-defense trainings

Anja Stukenbrock<sup>1,2</sup>

<sup>1</sup> Friedrich-Schiller-University Jena (FSU) – Institut für Germanistische Sprachwissenschaft Friedrich-Schiller-Universität Jena D-07743 Jena, Germany <sup>2</sup> Université de Lausanne (UNIL) – Université de Lausanne Faculté des Lettres Section d'allemand Quartier UNIL-Dorigny Bâtiment Anthropole CH-1015 Lausanne, Switzerland

Multimodality is not only a fundamental quality of face-to-face interaction, but becomes particularly important in instructional settings. Instructing someone to do something or requesting an instruction from someone requires not only speech, but crucially involves embodied practices implemented by gesture, gaze, body postures, movements etc. Instructions very often deal with bodily activities that require special motor skills, professional techniques, the manipulation of tools and objects. In these instances, embodied practices are not only part of the communicating act, but simultaneously constitute the object of communication. They become thematically relevant and are made available for visual inspection, demonstration, and assessment. Embodied objects of instruction thus become objects of embodied instructions. But how do participants contextualize moments in which embodied practices need to be attended to for their own sake, i.e. as practices to be taught and learned? The answer put forward in this paper is that deictics play a crucial role in organizing those moments temporally and coordinating them interpersonally. Multimodal studies on the interplay between modal deictics and embodied practices (Keevallik 2013; Mondada 2005; Streeck 2002, 2009; Stukenbrock 2014), particularly depicting and performing or pantomiming, show that modal deictics alerts the addressee to the fact that relevant meaning is to be found in the speaker's embodied practices. The same holds for the gestural use (Fillmore 1997) of spatial deictics, they combine with pointing gestures that addressees must attend to (Eriksson 2009; Fricke 2007, 2014; Kendon 2004; Stukenbrock 2015). Based on a corpus of 12 hours of video data recorded in self-defense trainings, the paper examines how verbal deictics within the context of instructional episodes interdigitate with different kinds of embodied practices that prominently occur in the data: pointing, "depictive or evocative practices" (Streeck 2008: 286), and enactments. It analyses the way in which embodied practices are temporally integrated into instructional sequences and interpersonally coordinated with other resources, particularly gaze and verbal practices (deictics). It claims that within instructional episodes, deictics assume a very specific function: They highlight specific moments within an emerging instruction and summon the addressee's gaze on a concurrent bodily activity that is constructed as a constitutive part of the instruction (Lindwall/Ekström 2012; Keevallik 2013; Stukenbrock 2014). More than that, they not only project the moment when close visual attention is requested, but also what kind of attention is due for an adequate understanding of the action and what kind of response is expected from the addressee.

Keywords: instructions, embodied practices, deixis, temporality, coordination





# Understanding Gesture and its Relation to Speech across the Lifespan

Nevena Dimitrova

Georgia State University – United States

When speakers talk, they gesture. This panel will address how the ability to interpret these gestures initially emerges, how children's ability to relate gestures to speech changes with age, and explore which cognitive abilities support gesture-speech integration in children and adults. The first paper explores toddlers' ability to interpret hand movements as meaningful representational gestures. Studying 2- and 3-year-old children, the authors examined the perceptual cues young children use to distinguish between actions, or bodily movements that are intrinsically meaningful, from gestures, whose meaning is representational. Comparing children's comprehension of object-based and representational actions, the authors found that by age 3, but not earlier, children are able to comprehend a movement as a representation. This study taps into the key question regarding children's ability to comprehend gestures as representations of goal-directed actions.

The second paper provides a systematic examination of comprehension of different gesture types (deictic, conventional, iconic) across different modalities (gesture-only, speech-only, reinforcing gesture-speech combinations, supplementary gesture-speech combinations) in 2-, 3-, and 4-year-old children. Results revealed an effect of age, gesture type, and gesture combination, with earlier comprehension for deictic gestures and reinforcing combinations. Importantly, comprehension of conventional and iconic gestures increased in reinforcing combinations, compared to supplementary ones. This result suggests that, for gesture types children they are still developing, comprehension of gesture is facilitated when the semantic content of speech reinforces gesture's semantic content.

The third paper investigates children's ability to comprehend-and integrate-semantic information conveyed in gesture-speech combinations. Comparing 3-year-olds, 5-year-olds, and adults, the authors asked at what age children start making use of information from an iconic gesture in order to integrate it to the semantic information expressed in speech. The authors found that the ability to comprehend semantic information conveyed simultaneously in speech and in gesture is ascertained by age 5, suggesting that development of this integration ability may be part of a broader developmental shift between the ages 3 and 5.

The fourth paper examines the cognitive underpinnings of iconic gesture comprehension in adults. Studying congruent (match between semantic information conveyed in gesture and speech) and incongruent gestures, the authors assessed the role of kinesthetic working memory (KWM) vs. visuo-spatial working memory (VSWM) in the comprehension of co-speech iconic gestures in adults. Results revealed that participants' performance was significantly better for congruent compared to incongruent gestures KWM-but not for VSWM-trials. The authors conclude that while both KWM and VSWM load impact speech-gesture integration, they do so in very different ways.

The panel discussion revolves around the importance of gesture comprehension for successful communication, the centrality of gesture-speech integration, and how these processes change as a function of cognitive development.

Keywords: gesture comprehension, co, speech gestures, gesture, speech integration



# Unpacking the ontogeny of gesture understanding: How movement becomes meaningful across development

Elizabeth Wakefield , Miriam Novack, Amanada Woodward

University of Chicago – United States

Gestures, hand movements that accompany speech, affect how individuals learn, remember, and think about information (e.g., Goldin-Meadow, 2003). Gestures may have these effects because they represent information in an easily accessible format (e.g., Goldin-Meadow, 2010). Yet, very little research has been conducted to elucidate the cues by which humans identify particular movements as representational, among the myriad of actions encountered on a daily basis (e.g., object-directed actions, meaningless-movement in the air). In a recent paper Novack, Wakefield, & Goldin-Meadow, (2015) established a framework for predicting when movements are likely to be seen as representational (i.e., gesture). Adults described one of three scenes: (1) an actor moving objects, (2) an actor moving her hands in the presence of objects (but not touching them) or (3) an actor moving her hands in the absence of objects. Results suggested that adults systematically use perceptual cues to differentiate between actions that complete a goal, gesture and other forms of movement: for example, the majority of adults interpreted empty-handed movements occurring in the presence of objects as representational, that is, as gesture. The present studies were conducted to investigate the ontogeny of the ability to systematically interpret some forms of movement as representational (i.e., gesture), as it is known that representational thinking is challenging for young children (e.g., Deloache, 1987). One possibility is that, even before children are able to understand what a ‘gesture’ represents, they will still identify an empty-handed movement as a representation of something because of a particular movement property. Alternatively, young children may view empty-handed movement as movement for its own sake (Schachner & Carey, 2013) until they gain more sophisticated representational abilities. In Study 1, we asked 4-9-year-old children (N=400) to describe the same three scenes as the adults in Novack et al. (2015). Interestingly, the ability to interpret empty-handed movements as representational changed across development, with children increasingly more likely to see such movements as gesture as they got older ( $\beta=0.57$ ,  $z=2.76$ ,  $p<.01$ ). Furthermore, the ability to see movements without objects present as representational showed the most protracted development ( $\beta=0.65$ ,  $z=2.22$ ,  $p<.05$ ). In Study 2, we consider how 18-month-old infants process similar action events, using eye-tracking. Preliminary data (N=47) indicate that infants watch the three types of events in distinct ways, suggesting that even at 18-months, infants may have some ability to categorize movement types. Together, these results show that the ability to describe movement as gesture, based on various perceptual cues, develops across childhood. These studies represent the first investigation of how the perceptual properties of movements we call ‘gesture’ are actually interpreted across development, and results have implications for how gesture should be used educationally.

Keywords: representational gesture, action, movement interpretation, development



# Integration of information from speech and iconic gesture in 3-, 5-year-olds and adults

Kazuki Sekine

University of Warwick

Integrating various types of contextual information is crucial in comprehending the speaker's intended message in everyday conversation. Gesture is an example of such contextual information. Though a number of previous studies investigated children's processing of speech-gesture combinations, many of the studies did not investigate if children show that the two modalities mutually constrain each other's meanings to arrive at a unified message. Thus, this study investigated how well 3- and 5-year-olds and adults integrate speech and iconic gesture, in comprehension, when the two modalities mutually constrain each other's meanings to form a unified interpretation.

In Experiment 1, 3-year-olds, 5-year-olds, and adults, who were all monolingual speakers of Japanese, participated. They were presented with short video clips on a computer screen. In each video clip, an actor demonstrated either an iconic gesture expressing everyday action (e.g., throwing something with both hands) or a spoken sentence referred to the same action (e.g., "throwing") or a combination of the two. The participants were instructed to select a photograph that best matched the message, out of four photographs; integration match (e.g., throwing a basketball with both hands), verbal-only match (e.g., throwing a baseball with a single hand), gesture-only match (e.g., opening a door with both hands"), and unrelated foil (e.g., a person taking a photo). When participants were shown only iconic gesture, even three-year-olds can select correct interpretations above chance. However, when they were shown both iconic gesture and speech, 3-year-olds did not select the integration match, indicating that they did not integrate unique information in the two modalities to arrive at a unified interpretation, but 5-year-olds showed an adult-like integration ability. When children failed to integrate iconic gesture and speech, they relied on information from speech.

In Experiment 2, another group of 3-year-old children participated. The material and stimulus were the same as Experiment 1 except that an experiment demonstrated a gestures and/or speech live, instead of an actor in video clips. When presented live, 3-year-olds could integrate speech and gesture. When failed to integrate iconic gesture and speech, just like Experiment 1, they relied on information from speech.

From these findings, we conclude that speech-gesture integration gradually develops in early childhood; however, live-presentation facilitates the nascent integration ability in 3-year-olds. We attribute 3-year-olds' poor integration ability to their weak ability to use contextual information in communication. These findings suggest that development of the ability to integrate speech and gesture follows the pattern of a broader developmental shift between 3- and 5-year-old children (Ramscar & Gitcho, 2007) regarding the ability to process two pieces of information simultaneously.



# Does comprehension of gesture follow a developmental trajectory similar to its production?

Nevena Dimitrova, Şeyda Özçalışkan, Lauren B. Adamson

Georgia State University – United States

Children produce deictic (point at cup) and conventional (nod head for affirmation) gestures earlier than iconic gestures (flap arms to convey flying [1]). Similarly, children produce gesture-speech combinations in which gesture conveys the same information as speech (reinforcing; "cup"+point at cup) earlier than combinations in which gesture conveys additional information not found in speech (supplementary; "drink"+point at cup [2]). Here we ask whether comprehension of gesture follows a trajectory akin to its production. Earlier work on comprehension focused on either a particular gesture type [3] or combination type [4]. Different from earlier work, this study aims to provide a comprehensive account of children's comprehension of different gesture-speech combinations across different gesture types and across a broader age range. We predict that children's comprehension of gesture will follow a trajectory similar to its production, with earlier comprehension of deictic gestures and reinforcing gesture-speech combinations. We tested 41 children: 13 2-year-olds (Mage=2;7), 15 3-year-olds (Mage=3;5), and 13 4-year-olds (Mage=4;6), using a newly designed task with 36 items that assess comprehension of three gesture types (12 deictic, 12 conventional, 12 iconic) embedded within four combination types (9 gesture-only [e.g., point at boy], 9 speech-only ["boy"], 9 reinforcing gesture-speech combinations ["boy"+point at boy], and 9 supplementary gesture-speech combinations ["standing"+point at boy]). Children were presented with each item one at a time and asked to choose from a pair of pictures, one of which was the correct choice (Fig.1). Children's comprehension scores (range=0-36) were examined using a three-way ANOVA, with age as a between-, and gesture and combination type as within-subject factors.

Results revealed an effect of age ( $F(2,38)=13.65$ ,  $p=.000$ ,  $h^2p=.42$ ), with differences between each age group ( $ps < .05$ ). Comprehension also varied by gesture type ( $F(1,68, 63.76)=22.79$ ,  $p=.000$ ,  $h^2p=.375$ ), with better comprehension of deictic gestures than iconic ( $p=.000$ ) and conventional gestures ( $p=.002$ ), and by gesture-speech combination type ( $F(3,114)=12.15$ ,  $p=.000$ ,  $h^2p=.242$ ), with better comprehension of reinforcing gesture-speech combinations than supplementary ones ( $p=.000$ ; Fig.2). There was a significant two-way interaction between gesture type and combination type ( $F(6,228)=2.47$ ,  $p=.025$ ,  $h^2p=.06$ ): children showed better comprehension of deictic gestures than both conventional and iconic gestures in supplementary gesture-speech combinations ( $ps < .001$ ), while they showed better comprehension of conventional and iconic gestures in reinforcing gesture-speech combinations than supplementary ones ( $ps < .001$ ). Our results suggest that gesture comprehension follows a developmental trajectory similar to its production-with earlier comprehension of deictic gestures and reinforcing gesture-speech combinations. However, when conventional and iconic gestures were presented in reinforcing combinations, comprehension also improved significantly, suggesting that the comprehension of gesture types that children have greater difficulty with is aided by having the same information expressed in both modalities.

Keywords: gesture comprehension, gesture, speech integration



# Working Memory and Speech-Gesture Integration in Adults

Seana Coulson<sup>1</sup>, Ying Choon Wu<sup>2</sup>, Shaina Santa Cruz<sup>3</sup>

<sup>1</sup>Department of Cognitive Science, University of California, San Diego (UCSD) – 9500 Gilman Drive Mail Code 0515 La Jolla, CA 92093, United States <sup>2</sup>Institute for Neural Computation, University of California, San Diego (UCSD) – United States <sup>3</sup>California State University, Fullerton (CSU-Fullerton) – United States

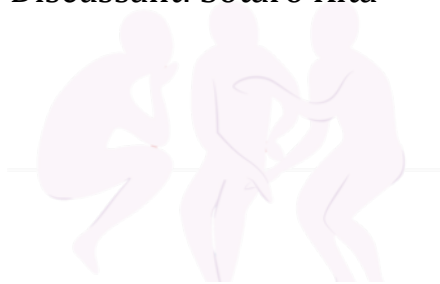
Co-speech iconic gestures often provide information that complements that present in the speech stream, indicating visual features of the referents and the spatial relationships that exist between them. Compared to the production of such gestures, relatively little research has concerned the cognitive processes that support their comprehension and their integration with the co-occurring speech. Work to date has suggested visuo-spatial working memory (VSWM) plays an important role, possibly because it can maintain visuo-spatial information activated by gestures until it can be integrated with relevant concepts activated by the linguistic information conveyed by the speech [1]. Here we explore whether an analogous role exists for kinesthetic working (KWM), the memory system for encoding body movements [2, 3]. To compare the role of KWM and VSWM in speech-gesture integration, we used a dual task paradigm as participants performed a multi-modal discourse comprehension task under conditions of either KWM or VSWM load. In the primary task, participants watched videos of a man describing household objects, viewed picture probes, and judged whether each picture was related to the preceding video. In KWM trials, we imposed a load on the KWM system by asking participants to remember and recreate body positions while performing the primary task. In VSWM trials, we imposed a load on the VSWM system by asking participants to remember and replicate sequences of grid locations while performing the primary task. At the beginning of each trial, participants encoded either body poses or dot locations, and mentally rehearsed them as they performed the discourse comprehension task. After responding to the picture probe on the primary task, participants were prompted to recall either the kinesthetically or the visuo-spatially encoded information. On KWM trials, they reproduced the poses encoded at the beginning of the trial. On VSWM trials, they indicated the sequence of dot locations by clicking the relevant grid locations with a mouse.

Dependent variables included the speed and accuracy of participants' responses on the discourse comprehension task. Repeated measures ANOVA on response times revealed a reliable interaction between memory load and speech-gesture congruency ( $F(1,50) = 5.62, p < 0.05$ ), reflecting significantly longer response times after incongruent than congruent gestures on KWM trials ( $t(50)=2.38, p < 0.02$ ), and similar RTs for incongruent and congruent gestures on VSWM trials ( $t(50)=0.43, n.s.$ ). Analysis of accuracy scores revealed a similar interaction ( $F(1,50) = 4.34, p < 0.05$ ) with marginally less accurate responses following incongruent than congruent gestures on KWM trials ( $t(50)=1.87, p=0.068$ ), and similar accuracy rates for congruent and incongruent gestures on VSWM trials ( $t(50)=0.25, n.s.$ ).

In sum, participants continued to benefit from congruent gestures under conditions of KWM, but not VSWM, load. Results suggest that while both KWM and VSWM load impact speech-gesture integration, they do so in different ways.

Keywords: visuo, spatial resources, kinesthetic resources, gesture comprehension, iconic gestures

Discussant: Sotaro Kita



# "Annotating (on) the Creative Body: From Research to New Tools"

Carla Fernandes, Vito Evola

Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa (FCSH-UNL) – Av. Berna, 26C  
1069-061 Lisboa, Portugal

Despite the significant advances of recent research into multimodal communication, human interaction and co-speech gestures, one focus missing in Gesture Studies is on how people use their bodies creatively to communicate. The performing arts, such as contemporary dance and theater, replicate daily life situations and emphasize emotions, thus providing a rich corpus for the analysis of creative multimodal communication, but they also offer a stage for research on collaborative decision-making processes, the interaction between emotions and bodily motions, and the use of bodies for communicating ideas. Choreographers and other performers are using innovative software tools for video annotation and documentation during the compositional processes of choreographies, rehearsals or workshops – tools that may be useful for Gesture Studies, Anthropology, and other scientific domains concerned with the body in motion.

In this panel, we propose a closer look at data from contemporary performing arts, considering that the implicit knowledge contained in this scarcely studied domain can be useful for the study of collaborative decision-making processes, the interaction between emotions and bodily motions or of alternative turn-taking rules where speech is not involved, for instance. We will be discussing different tools used in this context to annotate body movements, in order to suggest their relevance and value for the Gesture community.

The proposed panel therefore includes the three following papers and a discussant:

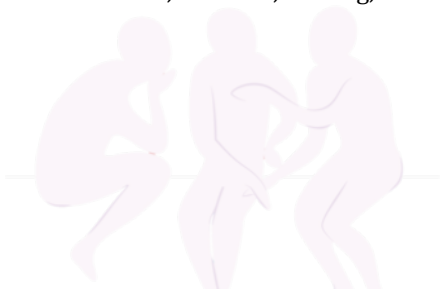
The first paper deals with the role of gaze and other body movements in collaborative decision-making and intends to contribute to the literature by presenting data collected in a silent dance improvisation session in the context of the performing arts and its quali-quantitative analysis, where the focus is on how the body, rather than speech, participates in the collaborative decision-making.

The second paper, motivated by the previous one, presents a proof-of-concept with a working software prototype to transpose annotations of 2D video data into a 3D environment for gesture research. The paper describes a work-in-progress tool where a multiparty scene is created by placing avatars and objects into a 3D environment.

The third paper will introduce the beta version of a multimodal annotation software tool, which supports annotation on video in real-time of any human activity that can be video-captured adequately. This tool should be relevant for the Gesture studies community as a preliminary help in note taking in real-time, while observing and filming specific situations of face-to-face interaction or of any other instance of multimodal communication.

A discussion will be guided and moderated by an expert in the field of annotation software used by the Gesture community, providing insights from his extensive experience in development and listening to what researchers need. (paper titles and discussant's bio attached in separate file)

Keywords: Gestures in performing arts, video annotation in real, time, gaze, body movements, 3D environments, decision, making, multimodality





# The role of gaze and other body movements in collaborative decision-making: A study on coordinating turns in a contemporary dance improvisation exercise

Vito Evola, Joanna Skubisz, Carla Fernandes

BlackBox Project, Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa (BlackBox, FCSH-UNL) – Portugal

How does a group of people collaborate and take turns when no speaking is allowed? Unlike previous studies on turn-taking (e.g. Duncan 1972; Sacks, Schegloff & Jefferson 1974; Kendon 1967; Ochs et al. 1996), the context of this inquiry is linguistically independent. The present study intends to contribute to the literature by presenting data collected in a silent improvisation session in the context of the performing arts and its quali-quantitative analysis, where the focus is on how the body, rather than speech, participates in collaborative decision-making. Five expert performers and five non-performers, joined by choreographer João Fiadeiro, were filmed separately during a contemporary dance exercise, the "Real-Time Composition Game" (Fiadeiro 2007). The Game involves participants sitting around a table, and through means of self-selection, performing single actions at a time on a table using various objects to develop compositions and learn the nature of improvisation.

A micro-analysis of portions of the session was conducted using ELAN (Lausberg & Sloetjes 2009). The annotation scheme codes for: a) directedness behavior (spatial location and orientation of the body, gaze points, object interaction); b) a formal description of movement units (MUs) of the various articulators; and c) a hermeneutic tier categorizing the functional-semiotic interpretation of the MUs (following a hierarchical taxonomy: self-focused, context-focused; communication-focused). The first two levels of annotation have an objective quality; the third level, based on the previous ones, describes raters' subjective interpretation of the participants' movements.

Despite completing the task both collaboratively and creatively, the non-performer group reverted to those turn-taking strategies common in everyday social interactions, minus those involving the vocal modality (i.e. frequent gaze shifts and communicative body movements). In contrast, we found that intersubjectivity was actively avoided by the expert group, both in the performers' bodily movements and mutual gaze, with turn management being regulated by means of alternative cognitive and social strategies, which will be presented. Besides the differences in communicative body movements across the groups, we will also compare self-focused movements, produced as neurophysiological responses to a cognitive load.

A qualitative macro-analysis of the two groups' entire sessions will focus on features directly related to the decision-making process throughout the improvisation exercises, such as hesitation versus determination. These differences will be analyzed under the light of recent literature focusing on social cognition and decision-making (inter alia Frith & Singer 2008). Constraints such as common knowledge, alignment, trust and the interaction of reason and emotion will be taken into account to contrast the results between the groups.

The results of these analyses and their implications for computational modeling of turns in the context of multimodality, as well as the relevance with questions of embodiment, creativity, and performance will be discussed together with future research.

Keywords: contemporary dance improvisation, creativity, decision making, gaze, intersubjectivity, Practice Theory, social cognition, social interaction and coordination, turn taking







# Transposing Formal Annotations of 2D Video Data into a 3D Environment for Gesture Research

Claudia Ribeiro, Vito Evola, Joanna Skubisz, Rafael Kuffner

BlackBox Project, Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa (BlackBox, FCSH-UNL) – Portugal

Annotating human body movements in videorecordings is at the core of contemporary gesture research, allowing scientists to process video data following customized annotation schemes according to the research questions at hand. With more and more gesture researchers focusing on formal aspects of human movements, the starting point of quali-quantitative analyses is the transcription of the movements using specialized software. Notwithstanding advances in data visualization, visualizing processed data in Gesture Studies (annotations) is currently limited to tables and graphs, which present the data in quantitative and temporal terms for further analyses. Alternative ways of visualizing the data could promote alternative ways of reasoning about the research questions (Tversky 2011). This paper intends to evidence the current void in gesture research tools and present an option for how Gesture scholars can visualize their processed data in a more "user-friendly" way. Recent efforts to incorporate the advantages of 3D coupled with new visualizations techniques afford new methods to both annotate and analyze body movements using learning algorithms (e.g. Deep 2015) to model virtual characters' behaviors based on video corpora annotated in software such as ELAN (Brugman & Russel 2004) and ANVIL (Kipp 2012). These advances, nonetheless, are underdeveloped in the area of Gesture Studies research and could provide interesting insights both regarding human and virtual characters interaction and semi-automatic ways of annotating and validating video data (Velloso, Bulling, & Gellersen 2013).

We present an example of usage, based on data from [AUTHORS] (2015), where a multiparty scene is transposed from the 2D video data to a modeled 3D environment. Avatars represent participants, and their body parts are labeled according to the formal annotation scheme used (left hand, right arm, torso, etc). Movements of the various articulators of each participant, as they were annotated using ELAN, are programed so their activation is evidenced in the 2D/3D representation of the participants' annotation. This recreates the scene of interest, allowing a more schematic visualization compared to the original video recording, isolating and foregrounding only the focal elements and eliminating visual "noise". Moreover, gaze annotations are visualized: unlike in the video, where gaze can only be tracked one participant at a time, this tool allows multiparty gaze annotations to be viewed synoptically as vectors, allowing the researcher to track the group's gaze-points simultaneously. As a computational model of annotations, statistical reports will also be available and may contribute to the reduction of incoherencies between human raters, and thus to higher value of inter-rater agreement and data reliability.

A work-in-progress, this proof-of-concept prototype intends to be made available to researchers interested in visualizing formal gesture annotations with minimal setup for their own quali-quantitative research on formal aspects of body movements.

Keywords: 3D, annotation, data visualization tool, gesture research software, Unity3D, visualization techniques



## "A multimodal video annotator for bodily motions: taking notes in real-time"

Carla Fernandes, Stephan Jürgens

Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa (FCSH-UNL) – Av. Berna, 26C  
1069-061 Lisboa, Portugal

This paper will introduce a video annotation tool that supports the multimodal annotation in real-time of any human activity that can be video captured adequately. It has been developed in the framework of a previous transdisciplinary research project on the documentation of intangible cultural heritage via the new digital media. We will describe its main functionalities, the different types and modes of annotation available, as well as its recent use and testing in the context of a professional theatre production. This software tool was conceived and designed to assist the creative processes of choreographers and dance performers, functioning as a digital notebook for personal annotations. It allows video annotation in real-time, using a live video stream, or post-event, by using a pre-recorded video stream. The tool allows different video annotation types (marks, text, audio, ink strokes and hyperlinks) and different modes of annotation and video visualization (continuous, sustained and delayed). It has provided significant advances (Silva et al. 2012; Cabral et al. 2011, 2012; AUTHORS 2013) which allow its use in several other fields of work, from Gesture studies and Anthropology to Sports, Educational environments or Journalism.

Other widely used video annotation tools such as ELAN (Wittenburg et al. 2006) or ANVIL (Kipp 2001) or more specialized ones such as The choreographers notebook (Singh et al. 2011) or PM2GO (2015) do not allow annotation in real-time and in many cases do not contemplate the same robust functionalities. Additionally, we have recently implemented a feature, which to our knowledge is not available on any other video annotator: through use of a mobile device, such as a smartphone, essential functionalities of the video annotator can be activated and controlled remotely via the Open Sound Control (OSC) protocol. This feature is particularly important for researchers and other users who wish to move freely away from the computer and take notes discreetly and in real-time in their respective environments. Other advantages of multimodal video annotation include for example the ability to draw on top of the video layer. This functionality allows seamless synchronization of the annotated content with the video recording, both in time and space. Audio annotations can be used when writing text annotations would take too long in cases where the observer wishes to accompany the live event in close detail.

We will present real world examples from our current research project, where we have accompanied the rehearsal process for a new piece by choreographer João Fiadeiro. We believe that our video annotator can be extremely useful for the Gesture studies community as a preliminary help in note-taking in real-time, while observing and filming specific situations of face-to-face interaction or of any other instance of multimodal communication.

Keywords: video annotation tools, real, time, multimodality, gestures and performing arts, body movements, creativity

Discussant: Hans Sloetjes



# What do we talk about when we talk about gestures? How to define gesture units in language development and evolution

Michèle Guidetti<sup>1,2</sup>

<sup>1</sup> Unité de Recherche Interdisciplinaire Octogone (EA 4156) (URI Octogone) – Université Toulouse le Mirail - Toulouse II : EA4156 – Pavillon de la recherche 5 allée A. Machado 31058 Toulouse Cedex 9, France <sup>2</sup> Modèles, Dynamiques, Corpus (MoDyCo) – CNRS : UMR7114, Université Paris X - Paris Ouest Nanterre La Défense – Bâtiment A - Bureau 402 A 200, avenue de la République 92001 Nanterre Cedex, France

Gestures are used in a wide range of contexts by humans and other primates and are expected to play a critical role in language development and evolutionary history. The growing body of gesture research has however not agreed upon a unified definition of gesture. Instead of pursuing the ultimate unification of gesture studies, this symposium aims at benefiting from the current discrepancy between methodologies and conceptual distinctions made by researchers from different (sub)fields of science. Whether gestures are considered in the light of evolution, development or pragmatics for instance partly determines how they are defined, classified and studied. Children begin to gesture long before talking. Gestures, such as pointing or waving goodbye, constitute the principal means of interacting with others before the emergence of language. Children continue to gesture after they start talking and even through adulthood, although the gesture/speech system is then reorganized (Kendon, 2004 ; McNeill, 2005, 2014).

Evidence from nonhuman primates is also relevant for our understanding of language evolution and development. Language may have evolved from manual gestures. For the hypothesis of the gestural origins of language (Corballis, 2014), gestures survive today as "behavioral fossils" that may or may not be coupled with speech.

Another question to be investigated involves the distinction between forms and functions of gestures. If we want to clearly understand language evolution and multimodal development, we need to distinctly define what we classify under the terms "forms" and "functions," which has not been done systematically in the literature. If we consider multimodal development from a constructivist and pragmatic viewpoint, we need to know how children and apes combine forms and functions, and how early these variations in form and function are available to them.

The aim of this symposium is to highlight and discuss these topics that are still much debated among international scholars working on gestures, both in human and nonhuman primates. The four symposium participants will address the following questions: (1) What has gesture to do with language evolution and development? (2) What is it that develops? and (3) Why studying both the forms and functions of gesture?

Crossing conceptual and methodological perspectives should allow us to uncover the implicit arguments that underpin our methodological choices, in particular regarding classification and terminology.

Four papers will compose the symposium, they will be followed by a discussion

- K. Fibigerova, M. Guidetti: "Salient criterions in gesture classification: developmental perspective in humans"
- M. Bourjade, H. Cochet, S. Molesti: "Gesture production in monkeys, apes and pre-linguistic children: The interplay between development and evolution"
- D. Leavens: "Radical Multimodality: Physical Gestures" - A. Meguerditchian : "What ritualization of novel intentional gestures in baboons tell us about the prerequisites of some language properties?"

## Symposium Guidetti: What do we talk about when we talk about gestures? How to define gesture units in language development and evolution

Keywords: gesture definition, language acquisition, evolution, non human primates gestures, terminology



# Salient criteria in gesture classification: developmental perspective in humans

Katerina Fibigerova<sup>1</sup>, Michèle Guidetti<sup>2,3</sup>

<sup>1</sup>Cognition, Langues, Langage, Ergonomie (CLLE-ERSS) – Université Michel de Montaigne - Bordeaux III, Université Toulouse le Mirail - Toulouse II, CNRS : UMR5263, Ecole Pratique des Hautes Etudes [EPHE] – Maison de La Recherche 5 Allées Antonio Machado 31058 TOULOUSE CEDEX 9, France <sup>2</sup>Unité de Recherche Interdisciplinaire Octogone (EA 4156) (URI Octogone) – Université Toulouse le Mirail - Toulouse II : EA4156 – Université Toulouse 2 Pavillon de la recherche 5 allée A. Machado 31058 Toulouse Cedex 9, France <sup>3</sup>Modèles, Dynamiques, Corpus (MoDyCo) – CNRS : UMR7114, Université Paris X - Paris Ouest Nanterre La Défense – Université Paris 10 Bâtiment A - Bureau 402 A 200, avenue de la République 92001 Nanterre Cedex, France

Gesture has become an important object of scientific interest during the last several decades. That observation is documented by an increasing number of new studies, publications and conference talks. However, when it comes to bringing up all pieces of acquired and presented knowledge together, one question emerges: Do we really make research, write and talk about the same "thing"? In literature, we observe a multitude of different and frequently incompatible understandings and classifications of gestures (see e. g., Guidetti, Fibigerova, & Colletta, 2014; Kendon, 2004; McNeill, 1992). With no intention to approach the ontological fundamentals of the topic, the aim of the above question is to initiate a debate on the variety of phenomena that actually can be, should be or actually are, considered as "gesture".

In order to establish a "common ground" among gesture scholars, we would like to address the following questions 1- what has gesture to do with language evolution and development 2- what is it that develops? and 3- why study both the forms and the functions of gesture?

1- If language is considered as a mean of adaptation (Verschuere, 1991) language acquisition is one way, but not the only one, to adapt to the social environment. There is a heuristic interaction between evolutionist theories and developmental theories which, as a consequence, let us to have a theoretical position on language acquisition where the function and the use are crucial and where language acquisition has to be tightly linked to social cognition. In this sense language cannot be considered as a "communicative revolution" since it is preceded by gestures in young children. Regardless of the position on the "gesture-first" hypothesis of language origin (for: Corballis, 2014 or against : McNeill, 2014), taking account social cognition and the functions and the uses of communication have lead to a close look to non human primates gestures

2- If for McNeill (2014), "there is no way to get from Acquisition 1 –before age 3/4 – to Acquisition 2 – from age 3/4- because "there are on different tracks", we would also like to have a closer look on the continuity/discontinuity in the use and thus on the classification/terminology of gestures at the prelinguistic and the linguistic periods

3- If we consider the use and the functions as crucial, we have to clearly dissociate the forms and the functions of gestures in a multilevel model of data analysis We will argue and illustrate these different points with data from current research.

Keywords: gesture definition, language acquisition, evolution, co, verbal gestures, terminology



# Gesture production in monkeys, apes and pre-linguistic children: The interplay between development and evolution

Marie Bourjade, Helene Cochet, Sandra Molesti

Cognition, Langues, Langage, Ergonomie (CLLE-LTC) – Université Toulouse le Mirail - Toulouse II – France

Evidence that gestures, in particular pointing, constitute intentional communicative signals has been reported both in nonhuman primates and pre-linguistic children. This is mostly based on the description of individuals' abilities to adjust their gestures to the attentional state of a partner (e.g., Bourjade, Meguerditchian, Maille, Gaunet, & Vauclair, 2014) and on the ability of recipients to interpret these gestures and respond by adjusting their behavior accordingly (e.g., Behne, Liszkowski, Carpenter, & Tomasello, 2012). Studies analyzing the characteristics of gestural communication may allow us to gain a better understanding of language evolution and development, but it has become more and more difficult to get a clear overview of this question due to a lack of agreed terminology, both within and between disciplines. Variations in the methods used, which are themselves influenced by the concepts and definitions adopted by the authors, also make the comparison between studies a complex task. In this talk we aim at addressing the extent to which the discrepancies about gesture phenomenology in the literature – in the way gestures are defined, classified and analyzed – can be understood in the light of theoretical stances and objectives that are more or less explicitly specified by researchers. This issue will first be illustrated by considering the relationships between communicative gestures and social cognition (notably joint attention, coordination and "common ground"), and the role of individual developmental experience in the emergence of these capacities in human children (Matthews, Behne, Lieven, & Tomasello, 2012) and nonhuman primates (Bourjade, Canteloup, Meguerditchian, & Gaunet, 2015, see also Bard & Leavens, 2014). Second, we will focus on the function of pointing gestures, outlining the inferences about the gesturer's intention that are usually made from several behavioral cues, such as body orienting, eye-gazing, the form of the gesture (i.e., palm orientation, hand shape) or from the persistence of the signal and its possible modification until the hypothetical goal is achieved (e.g., Cochet & Vauclair, 2010). Indeed, the meaning attributed to these cues may depend on specific research objectives and might sometimes reflect the tendency to champion the cognitive or communicative abilities of one's particular species. In particular, we will address the question of the referential nature of signals, through the distinction between imperative pointing and requesting gestures in human and nonhuman primates. Highlighting the links between theoretical postures and methodological choices appears to be a necessary step in the achievement of a unified study of gestures (e.g., Machado & Silva 2007; Scott & Pika 2012). And thus, it stands as a realistic endeavour, which may in turn benefit researchers studying gestures, especially with a comparative perspective.

Keywords: gestural communication, development, evolution, children, nonhuman primates, definitions, methodology, epistemology





## Radical Multimodality: Physical Gestures

David Leavens

School of Psychology, University of Sussex – School of Psychology Room 2A13 Pevensey Building, University of Sussex Falmer BN1 9QH, United Kingdom

Recently, numerous studies of communication in both human and nonhuman primates have converged on the observation that gestural communication is inherently multimodal (Armstrong, Stokoe, & Wilcox, 1994; Bourjade, Meguerditchian, Maille, Gaunet, & Vauclair, 2014; Leavens, Hostetter, Wesley, & Hopkins, 2004). Current approaches to the definition of gesture exclude manual actions that are “mechanically effective” (Hobaiter & Byrne, 2011; Scott & Pika, 2012), as though physical force does not constitute a channel or mode of communication. At the heart of these definitions are the assumptions that gestures are either (a) developmentally mature, abbreviated forms of earlier, motorically effective acts (Liebal & Call, 2012) or (b) evolved, ritualised signals (Smit, 1977), but neither pathway characterizes all gestures (Bard, Dunbar, Maguire-Herring, Veira, Hayes, & McDonald, 2014). There is a class of mechanically effective, tactile acts that are meaningful for both sender and receiver. Examples of communicative acts that must be rejected from the category, “gesture,” by virtue of the criterion of mechanical inefficacy, include, but are not limited to: hugs, tickling, grooming, slapping a child’s hand, tossing a child into the air and (hopefully) catching them, grabbing somebody by the face and kissing them, squeezing somebody’s hand or other body in sympathy or in a show of support, physically turning somebody’s head during a haircut, holding a loved one’s hand whilst walking together, exerting an open-palmed strike against a potential antagonist’s chest, and so on. I argue that such obviously communicative, yet mechanically effective acts belong properly to the study of nonverbal communication and that, moreover, they are better characterised as “physical or tactile gestures” than as “non-gestures,” because there is no systematic functional distinction between these physical gestures and non-tactile gestures. Anybody who has received a contemptuous slap in the face knows that they have been the recipient of a communicative signal; thus, the only apparent reason to classify such signals into an analytical category separate from other kinds of manual gestures, is that they are mechanically effective. This is an arbitrary criterion based on a disembodied metaphysical distinction between mechanical acts and communicative signals that is unnecessary and that ignores some very basic physics-if I call your name, your response to that signal depends critically on the mechanically effective characteristics of this auditory signal. Indeed, it is axiomatic that no communicative signal can be successfully conveyed if it lacks mechanical efficacy. This creates unnecessary conundrums, such as, how much mechanical efficacy is too much? This is because communication at the level of the whole organism necessarily involves a transgression of the transductive envelope which transforms mechanical force into electrochemical energy. Thus, at present, we are in danger of sacrificing ecological validity at the altar of a misguided methodological conservatism.

Keywords: Physical gestures, mechanically effective gestures.



# What ritualization of novel intentional gestures in baboons tell us about the prerequisites of some language properties

Adrien Meguerditchian

Laboratoire de psychologie cognitive (LPC) – CNRS : UMR7290, Aix Marseille Université – France

Comparative studies of nonhuman and human primates concerning communicative gestures know a renewed interest regarding the evolution of communicatory systems, in particular language. Most studies have been conducted in great ape species while the features of the gestural system in monkeys have relatively been little investigated. Such a comparative framework is needed to help reconstructing potential gestural prerequisites of some features of language properties such as intentionality, flexibility of learning, flexibility of use and left hemispheric lateralization. In the present paper, I will report the emergence and elaboration of novel gestures in the repertoire of some individuals in baboons *Papio anubis* housed in at the Station de Primatologie CNRS (such as "clapping", "cage bagging", oro-facial lips sounds and "food presenting") that have not been observed in other conspecifics. Interestingly, most of them seem to fit with the criteria of intentional communication that have been documented in the development of pointing in human infants. "Food presenting" for instance has been described in one single baboon female trying to engage a triadic referential communication with her offspring. This behavior consists of trying to redirect intentionally the attention of her offspring toward an external object by engaging mutual gaze when agitating the object in her finger toward him. I will show that this particular behavior has occurred for every infant baboons she has raised and has surprisingly stopped when the juveniles were able to feed themselves. I will discuss the implications of the emergence of those atypical gestures in term of social cognition, development (genetically-based, ritualization), and definitional aspect about gestures within the framework of evolution of language.

Keywords: non human primate gestures, ritualization, language properties



# The contributions of the left and right hemispheres to gesture production

Hedda Lausberg<sup>1</sup>, Pierre Feyereisen<sup>2</sup>

<sup>1</sup>Department of Neurology, Psychosomatic Medicine, and Psychiatry, Institute of health promotion and clinical movement science, German Sport University Cologne – Am Sportpark Müngersdorf 6, 50933 Cologne, Germany, Germany <sup>2</sup>University of Louvain – Belgium

In her seminal studies on hand preferences for free movements that accompany speech, Kimura (1973) proposed that the production of speech and gesture was controlled by a common motor system, which in right-handers was located in the left hemisphere. In another direction, psycholinguistic theories, with a few exceptions, propose that the production of co-speech gestures is linked to left hemispheric language production. However, regarding neurobiological correlates of gesture production recent empirical studies cast doubt on the proposition that co-speech gestures are exclusively generated in the left hemisphere.

In this symposium, based on empirical studies on hand preferences in healthy individuals and on patients with defined brain lesions, four researchers present their results concerning the respective contributions of the left and right hemispheres to gesture production.

Schedule of the symposium 5 -10 min Pierre Feyereisen (Hedda Lausberg) General introduction to the topic of the symposium 20 min presentation + 5 min discussion Hedda Lausberg (speaker), Harald Skomroch, Robert Rein, Katharina Hogrefe Hemispheric specialization in gesture production □ 20 min presentation + 5 min discussion □ H'el'ene Cochet (speaker) Can hand preference for gestures speak for the left hemisphere? 20 min presentation + 5 min discussion

Paraskevi Argyriou & Sotaro Kita (speakers), Christine Mohr

The association between metaphor speech production task and left-hand gesturing

20 min presentation + 5 min discussion

Katharina Hogrefe (speaker), Wolfram Ziegler, Nicole Weidinger, Georg Goldenberg

Does the right hemisphere contribute to the production of co-speech gestures?

10 - 15 min

Pierre Feyereisen, Hedda Lausberg (moderation of discussion)

General discussion

Keywords: Gesture production, Neuropsychology



# Hemispheric specialization in gesture production

Hedda Lausberg <sup>\*1</sup>, Harald Skomroch <sup>2</sup>, Robert Rein <sup>2</sup>, Katharina Hogrefe <sup>3</sup>

<sup>1</sup>Department of Neurology, Psychosomatic Medicine, and Psychiatry, Institute of health promotion and clinical movement science, German Sport University Cologne – Am Sportpark Müngersdorf 6, 50933 Cologne, Germany, Germany <sup>2</sup>German Sport University Cologne – Germany <sup>3</sup>Clinical Neuropsychology Research Group (EKN), Institut für Phonetik und Sprachverarbeitung (IPS), Ludwig-Maximilians-Universität München – Germany

With reference to Kimura's studies (1973) on hand preferences for co-speech gestures that suggest a left hemispheric common motor control system for speech and gesture, the neurobiological correlates of gesture production have often been associated with the language-dominant left hemisphere. However, recent empirical studies on individuals with brain damage including split-brain individuals cast doubt on the proposition that co-speech gestures are exclusively generated in the left hemisphere. To systematically explore the role of the left and right hemisphere in gesture production, the present study investigates patients with left and right hemisphere damage (LHD, RHD).

Twenty patients with LHD, 18 patients with RHD, and 20 matched controls, all right-handed, participated in the study. Most of the LHD patients were aphasic (14), hemiparetic (16) and apraxic (10), and most of the RHD patients were hemiparetic (16), had multimodal neglect (15), and visuospatial deficits (13). All participants watched 4 animated Tweety & Sylvester cartoons and retold the story immediately after each clip. The video-taped participants' hand movement behavior was analysed without sound by two independent certified raters with the NEUROGES-ELAN system. Interrater reliability was assessed with EasyDIAG.

The reliability of gesture identification was substantial in all three groups, and best for LHD. Overall, the RHD group displayed significantly less gestures, but not actions, than the LHD and Control groups. Concerning gestures types, form, spatial relation, and motion quality presentation gestures as well as deictics were displayed significantly more often by LHD group than by RHD. In the LHD group, there was no correlation of gesture (type) frequency with aphasia or apraxia. The exception were pantomime gestures which were shown significantly more often by the non-apraxic than the apraxic LHD subgroups.

Damage to the right hemisphere, but not to the left hemisphere resulted in a significant decrease in gesture production, suggesting a relevant right hemispheric contribution to gesture production. Further, assuming that LHD individuals with aphasia and apraxia have no remaining left hemispheric resources to generate gestures, the high frequency of gestures in this group suggests a right hemispheric production of gestures, too, in particular of gestures that present form, spatial relation, and motion quality concepts. Further, - with the exception of pantomime -, the frequency of the production of gesture was not influenced by aphasia and apraxia (as left hemisphere functions). Notably, the raters' high reliability in identifying LHD group's gesture types evidences that these patients clearly conveyed concepts of form, motion, space, etc. in gesture and that they showed no asymbolia. The present results are in line with the findings in split-brain patients that suggest a strong right hemispheric contribution of gesture production and they encourage to further exploring the potential use of right hemispheric gestural competences in neurorehabilitation.

Keywords: Gesture production, Neuropsychology



# Can hand preference for gestures speak for the left hemisphere?

Hélène Cochet

Cognition, Langues, Langage, Ergonomie (CLLE-LTC) – Université Toulouse le Mirail - Toulouse II – France

Following on work by Kimura (1973) on hand preferences for co-speech movements, evidence has more recently accumulated supporting the existence of a direct relationship between the asymmetry of communicative gestures and hemisphere lateralization for language (e.g., Bates & Dick, 2002; Cochet & Vauclair, 2010). This relationship, which contrasts with the one reported for the asymmetry of manipulative actions (e.g., Knecht et al., 2000; Meguerditchian et al., 2011), may be underlain by the continuity between non-verbal and verbal communication characterizing language acquisition (e.g., Colonna et al., 2010). The aim of this presentation is to define to what extent hand preference for communicative gestures can help determine whether the association between gestures and language develops along with left hemisphere dominance for language in children and adults. To address this question, it is necessary to consider the diversity of the human gestural repertoire, and in particular the nature of the relationship between hand movement and the referent. This relation is arbitrary and based on a cultural convention for symbolic gestures, whereas it is based on a spatial for deictic gestures like pointing.

Analyses of hand preference for different gestures also suggest that the function of pointing, itself intertwined with the intention of the gesturer and probably the nature of the mental activity at stake (Tomasello et al., 2007), is linked to the development of hemispheric specialization for language. Informative pointing, used to provide a partner with information he/she needs, is for example associated with strong right-sided asymmetries, which might reflect a key role of this function in the development of communication.

Finally, if left hemisphere specialization for language characterizes the vast majority of individuals in our species, it should not be forgotten that some individuals present right hemisphere or bilateral specialization. Considering atypical lateralization patterns, as early as possible in the course of development, may thus be necessary to gain a better understanding on the respective contributions of the left and right cerebral hemispheres to communication.

Keywords: gestures, hand preference, communication, language, development



# Right hemisphere linguistic processing triggers left-hand gesturing, and left-hand gesturing facilitates right hemisphere linguistic processing: a case for metaphor

Paraskevi Argyriou, Christine Mohr, Sotaro Kita

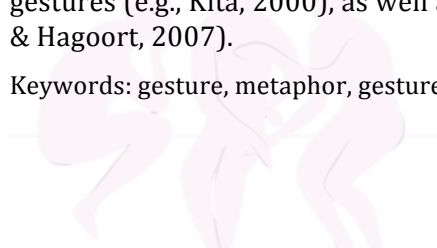
University of Birmingham – United Kingdom

This paper presents the relationship between linguistic processing in the right hemisphere and left-hand gesturing. We will focus on processing of metaphor, which critically involves the right hemisphere (e.g., Bottini et al., 1994), and representational gestures with metaphorical contents (McNeill, 1992). Experiment 1 investigates whether metaphor processing triggers left-hand gesturing. Experiments 2 and 3 investigate whether left-hand gesturing facilitates metaphor processing. Experiment 1 tested the hypothesis that differential activation levels of the two hemispheres due to hemispheric specialization for metaphor processes determines hand choice for co-speech gestures. To test this hypothesis, we compared hand choices for gesturing in 20 healthy right-handed participants during explanation of metaphorical vs. non-metaphorical meanings, on the assumption that metaphor explanation enhances the right hemisphere contribution to speech production. Hand choices were analyzed separately for: depictive gestures that imitate action ("character viewpoint gestures"), depictive gestures that express motion, relative locations, and shape ("observer viewpoint gestures"), and "abstract deictic gestures". It was found that the right-hand over left-hand preference was significantly weaker in the metaphor condition than in the non-metaphor conditions for depictive gestures that imitated action. Findings suggest that the activation of the right hemisphere in the metaphor condition reduces the likelihood of left hemisphere generation of gestures that imitate action, thus attenuating the right-hand preference.

Experiments 2 and 3 tested impact of right- vs. left-hand gestures on metaphor processing. Two experiments tested the "hemisphere-specific-feedback hypothesis" for gestures' self-oriented functions: gestures with a particular hand enhance cognitive processes in the contra-lateral hemisphere. Specifically we tested whether left-hand gestures enhance metaphorical explanation, which involves processing in the right hemisphere. In Experiment 2, right-handers explained metaphorical mappings in phrases such as "to spill the beans" (i.e., beans represent pieces of information). Participants were instructed to gesture with their left hand or right hand or do not gesture at all. Speech outputs included more elaborate explanations of the metaphorical mappings when participants gestured with their left hand than when they gestured with the right hand or did not gesture at all. Furthermore, we measured participants' mouth asymmetry during additional verbal tasks to determine individual differences in right-hemispheric involvement for speech production. The left-side mouth dominance, indicating stronger right-hemispheric involvement, positively correlated with the left-over-right-hand advantage in the gestural facilitation of metaphor explanation. Experiment 3 ruled out an alternative interpretation of Experiment 2 that the observed left-hand advantage was due to right-hand prohibition (i.e., causing distractions). These results supported the hemisphere-specific-feedback hypothesis.

Taken together, we conclude that left-hand gesturing and the linguistic processing in the right hemisphere activate each other. This conclusion has implications for self-oriented functions of gestures (e.g., Kita, 2000), as well as shared neural processing of language and gesture (Willems & Hagoort, 2007).

Keywords: gesture, metaphor, gesture handedness, brain hemispheric lateralisation







# Does the right hemisphere contribute to the production of co-speech gestures?

Katharina Hogrefe, Wolfram Ziegler, Nicole Weidinger, Georg Goldenberg

Clinical Neuropsychology Research Group (EKN), Institute of Phonetics and Speech Processing, Ludwig-Maximilians-Universität München – Germany

The relationship of gesture and speech has been subject to numerous studies. In cognitive neurosciences the question whether language and gesture originate from the same neural substrate has attracted interest. As the left hemisphere has been shown to be dominant for language processing, most research has been conducted so far with persons with left hemisphere damage and consecutive aphasia. Recent findings suggest that the language disorder per se does not hinder gesture production, but that accompanying neuropsychological disorders that frequently appear as a consequence to left hemispheric lesions have an impact on the ways gestures are used (Hogrefe, Ziegler, Weidinger, & Goldenberg, 2012). Hence, the left hemisphere seems to be important for gesture production, but the relationship of gesture and speech may be not as strong as often postulated. So far, only a few studies with small sample sizes have looked at gestural behavior in persons with right hemisphere damage: These studies all indicate that the right hemisphere makes an essential contribution to gesture production, too (e.g. Cocks, Hird, & Kirsner, 2007; Hadar, Wenkert-Olenik, Krauss, & Soroker, 1998).

It is widely acknowledged that the right hemisphere plays – amongst others – an important role for the processing of pragmatic aspects of communication. Persons with damage to the right hemisphere often display communication disturbances that may affect narrative-discourse abilities, the processing of metaphors, as well as the processing of prosody. Interestingly, studies focusing on gesture production in these individuals revealed a reduced gestural output.

In the current study, we aimed to test the hypothesis of a reduced gestural output in a large sample of participants with right hemisphere damage. Furthermore, we intended to investigate if in persons with right hemisphere damage gestural behavior is more closely tied to communicative processes like intonation and discourse than to basic measures of speech production.

We present data of 32 participants with right hemisphere damage and of 20 healthy control participants. Participants were asked to retell a video clip of a Sylvester and Tweety Cartoon. We will present data on basic parameters of gesture and speech (inter alia number of words, number of hand gestures, gesture-to-word-ratio, number and completeness of phrases). Furthermore, a measure on intonational variability and two measures on discourse production will be presented.

Preliminary results of 20 healthy control participants and 18 participants with right hemisphere damage indicate that the patient group produced lower intonational variability and less informational content. Furthermore, patients produced fewer gestures than control persons. The finding that the gesture-to-word-ratio was also reduced indicates that this effect is independent of the likewise reduced verbal output. Gestural decline may rather be one aspect of the communicative disorder that frequently appears after damage to the right hemisphere.

Keywords: Co, speech gesture, brain damage, communication disorder



# From co-speech gesture to sign. Cases of sign language creation in the Middle and South America

Olivier Le Guen

Centro de investigación y estudios superiores en antropología social (CIESAS) – Calle Juárez 87, Col.Tlalpan, Del. Tlalpan C.P.: 14000, México, D.F., Mexico

Recently, many so-called Emerging Sign Languages (ESL) (Meir et al. 2010) have been documented in Middle and South America ranging from Home sign systems (e.g. Zinacantan HS, see Haviland 2011, 2013a,b, 2015) to Village Sign Languages (e.g. Yucatec Maya Sign Language, see Le Guen 2012a,b or Chatino SL, see Hou and Mesh 2015a,b) and sign languages used by larger Deaf communities in institutional settings (e.g. Nicaraguan SL, see Kegl et al. 2001). What all these languages have in common is a rich communicative substrate in which speakers of the surrounding spoken (often indigenous) languages use many co-speech gestures in a systematic way. These gestures range from iconic to quotable gestures (or emblems, see Kendon 1992) that are available for deaf people born in these communities to use and transform them into signs (Le Guen 2012). Because many of these sign languages are created by both deaf and L2 bilingual-bimodal signers, integration of co-speech gestures not only facilitate the creation of lexicon but also the shared use of the emerging SL among the larger community, i.e. between hearing and deaf signers.

This symposium aims at discussing the how some co-speech gestures are transformed and adapted into signs, raising several issues such as:

- What processes are involved in the creation of signs that derive from iconic gestures on the one hand and from quotable gestures on the other hand?
- Which changes do co-speech gestures undergo when they are adapted into signs (semantic extension, desemantization) and which paths of development do they follow (grammaticalisation of holophrastic gestures, concept gestures becoming adverbial signs, etc.)
- How do sign languages in Middle and South America compare to each other in respect to the creation of signs based on co-speech gestures? Which similarities do they display and which cross-linguistic differences can be found?
- How can attitudes and ideologies towards gesture and multimodal communication facilitate or inhibit the emergence of sign languages?

Keywords: Sign language, co, speech gesture, mesoamerica, emerging sign language, iconicity, creation



# Paths of lexicalization from Yucatec Maya co-speech gestures to Yucatec Maya Sign Language signs (Mexico)

Olivier Le Guen

Centro de investigación y estudios superiores en antropología social (CIESAS) – Calle Juárez 87, Col. Tlalpan, Del. Tlalpan C.P.: 14000, México, D.F., Mexico

In this talk, I explore several lexical domains and parts of speech of Yucatec Maya Sign Language (YMSL), an emerging sign language that arose in different communities in the Yucatec peninsula (Mexico) where deaf people were born. I examine data from two villages and analyze how some signs have been adapted from surrounding Yucatec Maya (YM) co-speech gestures. The main finding is that gesture types predict (to some extent) the categories of signs. Furthermore, a comparison between the two communities reveals that the adaption of similar gestures lead to common processes of lexicon creation, although there is no contact among signers from each village. Data were collected using interview, recording of spontaneous discourses and conversations and elicitation using stimuli.

Lexical gestures get transformed, unsurprisingly, into nominal signs. However, some can also be derived as adjectival signs as well as nouns. For instance, the YM gesture for HOT/SPICY can refer to both HOT/SPICY and CHILI in YMSL, see Fig. 1.

Holophrastic gestures (Kendon 1992), like COME HERE, FINISH, etc. tend to keep their meaning as speech acts (e.g. orders) but can also desemanticize and transform into grammatical markers (e.g. "and") and auxiliaries, see fig. 2 FINISH TO DIE (from the Maya calque ts'ok (u)kimil).

YM speakers, as well as speakers of various other languages in Central America, make use of gestures for shape and size, that are adapted in YMSL (often as compounds with another sign) as Size and Shape Specifiers (SASSs) (Emmorey 2003, Supalla 1986), see fig. 3 for GIRL (lit. FEMALE-SASS.upritghhuman).

Iconic YM gestures that describe everyday actions, are conventionalized in YMSL as verbal but also nominal signs. In this latter case, we notice an interesting compound construction with SASSs to derive the verbal sign into a noun (as Haviland (2013) also observed in Zinacantan homesign).

Finally, YM concept gestures (Kendon 2004), for example for time, are adapted into adverbial signs (Le Guen 2012).

I will also show that many signs arose are innovations created by the deaf and bilingual-bimodal signers and do not have corresponding gestural precursors. Interestingly, many of those appear in domains that are not "gesturally encoded" in YM. The signs for colors, for instance, are, as we could expect, different in each community.

Despite the fact that YMSL signers from different communities have never been in contact, it turns out that signers have similar intuitions and we can observe similar processes involved in the lexicon construction based on YM co-speech gestures, with the exception of domains that lack a gestural equivalent in YM. In this sense, one possible theoretical claim would be that multimodal communication among Yucatec Maya speakers represents a proto-sign Yucatec Maya sign language that lead to the production of variants of YMSL.

Keywords: Yucatec Maya sign language, co, speech gesture, emerging sign language, Mexico



# One Emblem in Two Types of Talk: How Speakers and Signers use the 'Go' Gesture in a Chatino Community

Kate Mesh

The University of Texas at Austin – United States

I explore how the 'Go' gesture-an emblem (in the sense of [1], [2]) or quotable gesture (following [3], [4], [5])-is used in a Chatino community in the San Juan Quiahije municipality of the Juquila district in Oaxaca, Mexico. Users include hearing people who produce the gesture alongside speech in San Juan Quiahije Chatino (SJQ), and deaf people who have incorporated the gesture into the lexicon of a developing signed language, San Juan Quiahije Chatino Sign Language (SJQCSL). The gesture is produced by moving the extended hand in an upward arc (Fig. 1 & 2). It may be produced with either an extended index finger (Fig. 1) or a flat hand with opposed thumb (Fig. 2). Hearing gesturers produce both forms in isolation and accompanying verbs of motion such as *tša24*, 'go-from-base', and *kya24*, 'go-to-base'. They report that both gestures refer to the act of going. This supports an analysis of the two forms as variants of a single emblem, adopting either approach suggested in [6].

I investigate the factors influencing choice of variant among hearing gesturers and deaf signers, drawing from over 11 hours of video-recorded interviews about the local environment following [7]. These were performed with 44 hearing gesturers and 5 deaf signers during an 8-month field trip in 2015. Tokens of the 'Go' gesture were coded for hand configuration and subject of the (signed SJQCSL or accompanying spoken SJQ) verb phrase. Where a goal of motion was expressed, tokens were coded for goal distance.

I show that SJQ speakers show limited sensitivity to goal distance when selecting a variant of the 'Go' gesture. Deaf signers, while exposed to both variants from infancy, show a strong preference for the extended index finger variant regardless of goal distance. In two cases, deaf signers have co-opted the formal distinction to express information about the nature of the verbal subject. When the subject is a road or trail, as in the road goes this way, these signers prefer the open handshape, often producing a formally similar, two-handed sign denoting 'Road' at the beginning of the 'Go' gesture (Fig. 3). For all other uses of the verb go, these signers prefer the extended index finger form of the 'Go' gesture.

My findings on the selective adoption and elaboration of variants of the 'Go' gesture in SJQCSL suggest that the first step toward analyzing the lexicon of an emerging signed language must be an investigation of the gestures produced in the surrounding community, focusing on their formal variants. I close by describing how this method has been implemented in the Chatino Sign Language Documentation Project.

Keywords: Emblem, Quotable gesture, emerging sign language, methodology



# Borrowed Forms: From Co-speech Gestures to Signs in Family Homesign Systems from Nebaj, Guatemala

Laura Horton

University of Chicago – 5848 S University Ave, Green 510, Chicago, Illinois 60637, United States

Recent experimental and computational work on emerging languages (Richie, Yang and Coppola, 2013) demonstrates that both the quantity and quality of communicative interaction impacts the rate of conventionalization of the lexicon of young and emerging sign language systems. Richie et al find that the lexicons of deaf individuals who use a young sign language, Nicaraguan Sign Language (NSL) and are part of a rich communicative environment, conventionalize faster than the lexicons of deaf individuals who do not have contact with the deaf community and invent their own structured gestures, called homesign systems, to communicate with family and friends (Goldin-Meadow 2003). Richie et al suggest that the diversity of both communication partners and contexts of use available to NSL signers accelerates conventionalization of the lexicon.

Our study extends this work with an analysis of sign lexicons in shared homesign systems in Nebaj, Guatemala. We use the term shared homesign system to describe gestural systems created by families with multiple generations of deafness. In particular, we compare the lexicons of two families in which at least one adult and one child are deaf and have not learned a sign language or Ixhil or Spanish, the ambient spoken languages.

We analyze a set of elicited sign forms both longitudinally and cross-sectionally – between multiple users who are in daily contact with each other, for example a mother who is deaf, her daughter who is also deaf and her son who is hearing but uses the shared homesign system to communicate with his mother and sister. Signers described pictures of 60 familiar animals, foods and tools. We code each form that a homesigner produced for its conceptual component (after Richie et al) and compare forms using a frequency-weighted hamming distance. We find that, while the system appears to be less conventionalized across users, the presence of communication partners who use the shared homesign system may promote greater conventionalization within an individual over time.

To examine the relationship between gestures used by hearing interlocutors while speaking and sign forms in shared homesign lexicons, we provide a descriptive account of a gesture common to both communicative systems.

We suggest one mechanism that may accelerate conventionalization could be the process of borrowing forms from co-speech gesture and that this process is facilitated by a rich gestural substrate in the hearing community and by hearing bi-modal bi-lingual signers in shared homesign families who engage equally with the speaking community in public and their micro signing community at home. We discuss ways in which co-speech forms might be taken up within a shared homesign system and reinterpreted to become part of a dedicated, structured communicative system fully in the manual modality.

Keywords: homesign, emerging sign language, Guatemala, sign language, language emergence, language acquisition



# Creating conformity: imagery, iconic strategies, and coerced convention in a new (sign) language

John Haviland

University of California, San Diego (UCSD) – United States

Zinacantec Family Homesign (or "Z") is a new sign language emerging spontaneously in a single family in a remote Mayan Indian village in highland Chiapas, Mexico. Three deaf siblings, their speaking age-mates, and their infant children, who have had contact with no other deaf people, represent the first generations of Z signers. The semantics and pragmatics of the matrix spoken language of the community, Tzotzil (Mayan), are well-studied (deLeon 2007, Groark 2009, Haviland 1987, 1989, Laughlin 1975), as are parallel systems in related languages (Hanks 1984, 1990, Zavala 2000, Kockelman 2003ab, 2004). Tzotzil semantics, for example, revolve around an elaborate structure of "root" types, some syntactically multivalent, and centrally including the characteristic pan-Mayan category of "Positional" roots involving many perceptual aspects of entities: size, shape, and visible appearance. The special interest of the current research is the emerging linguistic structure in the nascent sign language. Because it is in its first generation, Z presents an unusual opportunity to observe the early stages of linguistic creation, innovation, and change directly, providing direct evidence for grammaticalization in the morphology and syntax, and for conceptual creativity in the choice of lexical and pragmatic representations. Overviews of grammaticalization in sign languages (Pfau & Steinbach 2011, Janzen 2012) mostly involve progression from lexical signs to grammatical formatives. Though relatively recent, comparative studies of emerging rural sign languages (e.g., Zeshan 2003, 2004, 2006) have argued for possibly gestural origins for both lexical and grammatical formatives. Speakers' gestures are selectively borrowed and lexicalized into sign, and then, over time, systematically regimented into signed grammatical roles. (For such grammaticalization paths in established sign languages, see Wilcox & Wilcox 1995, Wilcox 2004, 2007, Janzen & Shaffer 2002.) Gestures used by speakers of spoken languages are plausible sources for at least some lexemes in the sign languages used by members of the same communities (Perniss & Zeshan, 2008; de Vos, 2012; Le Guen, 2012, Haviland 2013c, 2014). Using data from both semi-formal elicitation and spontaneous conversational exchanges in Z, this paper explores both convergence and divergence among the members of even this tiny speech (sign) community in the apparent conceptual bases of lexical and grammatical signs over the ongoing course of development of the language, up to and including the only fluent 2nd generation signer (8-year-old son of the oldest deaf adult). I consider the multiple conceptual imagery of the Z lexicon, its links to and plausible origins in speakers' gestures and culturally specific patterns of human action ("gesturecraft" [Streeck 2009]), and its metalinguistic regimentation, suppression, and modification in signed interaction.

Keywords: emerging sign, homesign, speakers gesture, conceptual creativity





# From Cognition to Communication: The Effects of Action and Gesture Across the Lifespan

Kelsey Lucca<sup>1</sup>, Miriam Novack<sup>2</sup>, Elizabeth Wakefield<sup>2</sup>

<sup>1</sup>Duke University – United States <sup>2</sup>University of Chicago – Edward H. Levi Hall 5801 South Ellis Avenue Chicago, Illinois 60637, United States

Theme panel summary statement: The actions and gestures we make with our hands influence how we learn and how we communicate. Although similar in some ways, it is the distinctions between actions and gestures that may be most important for cognitive processes. Actions may be more visually rich than gestures, and viewers may predominately interpret them in relation to object-directed goals. In contrast, gestures may be more abstract, and viewers may interpret them as having the capacity to carry a wider range of intended meaning.

Although research has begun to disentangle the roles that action and gestures play in learning and communication (e.g., Cook & Tanenhaus, 2009; Goldin-Meadow & Beilock, 2010; Kelly et al., 2015), important questions remain as to when and how gestures versus actions facilitate or hinder performance in varying contexts, and across the lifespan. This symposium begins to address this gap by providing evidence for the differential effects of action and gesture on learning and communication, across the lifespan and across contexts.

Papers I and II compare the roles that actions and gestures play in learning new words. Paper I explores how infant-produced gestures, actions, or looks towards objects differentially affect subsequent mapping of spoken words onto those objects. Paper II extends this work to older children, and more complex word learning, by examining how children learn new verbs through action or gesture experience.

Papers III and IV extend this work to the domain of communication, comprehension, and memory. Paper III examines how children differentially interpret hand shape information in representational contexts (i.e., gesture) or action contexts (i.e., reaching). Paper IV compares the role that adult's actions and gestures play in the enactment effect.

Collectively, these papers integrate research conducted across the lifespan and varying contexts to paint a developmental picture of the differential effects gesture and action have on learning and communication. In sum, they demonstrate that the important distinction between action and gesture begins very early in life, extends into adulthood, and is influential across various contexts.

Additionally, the proposed symposium opens up new areas of research by raising important questions regarding the specific roles of action and gesture during learning and communication. For example, these studies highlight that the impact of actions and gestures on learning and communication may be very different based on whether these behaviors are being produced or perceived. Moreover, these studies also demonstrate that differences in gesture form (e.g. more concrete, action-like vs. more representational) have important implications for how gestures versus actions are utilized and understood.

Our discussant, Susan Wagner Cook, is an expert in this topic and will be able to synthesize how these papers impact the field of gesture research.

Keywords: Gesture, Action, Cognition, Learning, Communication, Development





# The Origins of the Gesture-Action Distinction: The Influence of Infants' Actions vs. Gestures on Early Word Learning

Kelsey Lucca, Makeba Wilbourn

Duke University – United States

A recent debate in the field of gesture research has been whether gestures, compared to direct actions on objects, offer unique cognitive benefits. While research has begun to disentangle the differential influences of gestures and actions on cognition, important questions remain about the origins of these effects. Here, we test infants as they are just beginning to produce these behaviors to determine when the gesture-action distinction emerges.

Studies 1 and 2 tested whether infants' gestures (i.e., points), compared to attempted actions (i.e., reaches) or no actions (i.e., looks), towards novel objects have differential effects on infants' ability to map labels onto those objects. Twelve and 18-month-olds ( $N=108$ ) were tested in an experiment designed to elicit preference-behaviors (i.e. points, reaches, or looks) directed towards novel objects (Figure 1). After infants indicated their preference towards one of the objects, an experimenter provided a nonsense label for that object (Study 1) or for an object infants did not prefer (Study 2). Subsequently, infants' learning of object-label relations was tested in a preferential-looking task. This labeling-then-testing procedure was repeated three times with different object pairs. Across trials, infants changed their behavior (e.g. pointing to reaching), allowing us to assess differential learning, within-subjects, as a function of the type of behavior produced towards an object before it was labeled.

In Study 1, 18-month-olds, but not 12-month-olds, more readily mapped labels to objects during trials in which they had first pointed towards those objects (proportion looks to target,  $PLT = 70\%$ , Figure 2) compared to trials in which they first reached ( $PLT = 57\%$ ,  $p = .01$ ) or only looked towards the desired objects ( $PLT = 52\%$ ,  $p = .008$ ) – demonstrating that communicative gesturing, but not attempts to act on objects, reflects a readiness to learn. When the experimenter labeled objects infants did not prefer (Study 2), pointing did not result in superior learning ( $p's > .05$ ).

Why are infants best equipped to learn in response to their gestures, but not actions? Recent research demonstrates that infants use gestures as a way to seek-out information. This explains why infants only learned when information was provided about objects gestured towards (Study 1), but not when information was provided about objects not gestured towards (Study 2).

Study 3, currently in progress, directly tests the information-seeking hypothesis of infants' early gestures. In a paradigm similar to Study 1, an experimenter elicits gestures from 24-month-olds, and responds with language-specific information (e.g. labels), broader conceptual information (e.g. functions), social information (e.g. emotions), or no information. If infants expect certain types of information to be provided in response to their gestures, they should demonstrate satisfaction when that information is provided, and be best equipped to learn that information.

Keywords: Gesture, Action, Cognition, Learning, Communication, Development, Language, Word Learning



# Action for Learning, but Gesture for Generalization: Effects of Different Movement Experience on Verb Learning

Casey Hall<sup>1</sup>, Elizabeth Wakefield<sup>1</sup>, Karin James<sup>2</sup>

<sup>1</sup> University of Chicago – Edward H. Levi Hall 5801 South Ellis Avenue Chicago, Illinois 60637, United States <sup>2</sup> Indiana University Bloomington – United States

Action and gesture are forms of movement we produce and observe daily that differ in many ways. Here, we define actions as movements performed on objects that create change in the world, whereas gestures are performed in the air, and do not bring about change. Actions complete a goal; gestures represent ideas. These forms of movement affect cognition: encouraging children to either gesture or perform actions during instruction facilitates learning (e.g., James, 2010; Wakefield & James, 2015). However, action and gesture are rarely studied together, and there is reason to think they may differentially benefit children. We address this possibility in the current studies, asking whether action and gesture differentially impact how 4 and 5 year-olds learn novel verbs. We know that verb learning is difficult for children (e.g., Gentner, 1982). Part of this difficulty stems from children's tendency to associate a verb not only with the action it represents, but with the particular object with which it is learned (Kersten & Smith, 2002). In two studies, we investigated how gesture and action differentially impact how well children learn, generalize, and retain new verbs. In both studies, children were asked to perform or observe actions on objects versus gestures in relation to objects while learning novel verbs (Figure 1). Specifically, children in the action condition produced or observed simple movements (e.g., twisting a knob), which were performed on novel objects. Children in the gesture condition produced or observed these same movements, performed near, but not on, the novel objects. Both groups labeled the movement each time it occurred to help them associate the movement with the verb (e.g., saying "ratcheting" while twisting a knob). Results from Study 1 (N=48), showed that children learned verbs significantly better through action experience ( $\beta=0.96$ ,  $z=2.04$ ,  $p<.05$ ), but were still able to learn through gesture experience. Furthermore, self-produced movements facilitated learning significantly better than observing movements in both the action and gesture conditions. This similar pattern for learning through production versus observation may suggest that gesture and action foster learning through similar cognitive processes, even though learning may occur more quickly through action. However, results from Study 2 (N=44) revealed additional differences between learning through action versus gesture: children who learned through gesture generalized verbs to new contexts significantly better than children who learned through action ( $\beta=1.80$ ,  $z=2.74$ ,  $p<.01$ ), and this pattern held when knowledge was assessed after a 24-hour delay ( $\beta=2.51$ ,  $z=2.74$ ,  $p<.01$ ). Unlike action, gesture can highlight important components of an action without being tied to a specific object, and thus, it may be particularly beneficial for generalization. Together, our findings indicate that gesture and action may aid learners through overlapping but distinct mechanisms.

Keywords: Action, gesture, learning, generalization



## 2.5-year-olds Interpret Handshape Differently in Action and Gesture

Miriam Novack, Courtney Filippi, Amanda Woodward

University of Chicago – Edward H. Levi Hall 5801 South Ellis Avenue Chicago, Illinois 60637, United States

Interpreting iconic gestures is challenging for children under the age of 3 (e.g., Tolar et al., 2008). This difficulty likely has to do with the fact that gestures are representational forms, and young children struggle with representational thought (e.g., DeLoache, 1995). In contrast, young children are adept at interpreting other kinds of action, such as reaches (e.g., Ambrosini, et al., 2013). In the current study we ask whether embedding handshape information in an instrumental action (i.e., reaching) improves 2.5-year-olds' comprehension of handshape information. In Study 1a, 36 2.5-year-olds played a helping game in which two toys of the same type (e.g., two cars) but of different sizes (e.g., one big car and one small car) were placed on the ground in front of an experimenter. The experimenter produced either a large handshape or a small handshape as part of either a reach (Reach Condition,  $n=18$ ) or gesture (Gesture Condition,  $n=18$ ) to indicate one of two toys (See Figure 1). Children were then encouraged to give the experimenter the toy that she was asking for. Children in the Reach Condition selected the correct toy significantly more than children in the Gesture Condition ( $\beta=0.83441$ ,  $z=2.680$ ,  $p<.007$ ), and also significantly above chance  $t(17)=3.21$ ,  $p<.005$ , while children in the Gesture Condition performed at chance  $t(17)=-0.383$ ,  $p=0.70$  (See Figure 2). In study 1b we explored whether children's difficulty in the gesture condition might be due to the physical distance between a gesture and its referent. An additional 18 2.5-year-olds saw an experimenter hold out either a large or small box in gesture space to request one of the two toys. Children in the Box Condition performed significantly better than children in the Gesture Condition  $\beta=0.623$ ,  $z=2.036$ ,  $p<.04$ , suggesting that difficulty in interpreting gestures cannot be due to the physical distance between a gesture and its referent. Rather, interpreting gestures is hard because of their status as representational symbols. These results suggest that children may use different processing capacities to interpret another's movements depending on how they categorize that movement. When children see hands as part of a reach, they may gloss the event as an "action" and use their motor processing skills to interpret that action (e.g. Ambrosini, et al., 2013). In contrast, when children view a movement as a gesture, they may attempt to engage some representation processing skills, which are still underdeveloped at age 2.5. Ongoing work is exploring whether children use top-down or bottom-up process to make an initial categorization of a movement.

Keywords: Action, Gesture, Representations, Reaching



# Do Gestures and Actions Affect Memory Differently When Produced for Oneself Versus Others?

Rachel Neal, Spencer Kelly

Colgate University – 13 Oak Dr., Hamilton, NY, 13346, United States

## Background

The present study investigates the extent to which actions and gestures are integrated with speech during language production and memory. We explore this question by investigating the "enactment effect" (Cohen, 1989), which demonstrates that memory for verbal phrases is enhanced when encoded with actions (Engelkamp, 1995) and gestures (Feyereisen, 2009). If gestures are indeed integrated with speech more than actions, we predict that: 1) gestures will produce better memory for speech than actions (Kelly, Healey, Özyürek, & Holler, 2014), and 2) this memory should be enhanced more when communicating with others than just oneself (Alibali & Heath, 2001).

## Method

The present study utilizes a mixed design of enactment type and partner presence. Participants are instructed to verbally repeat a list of phrases (Verbal Only), verbally repeat while producing gestures (Verbal+Gesture), and verbally repeat while acting on physical objects (Verbal+Action). In addition, participants are assigned to two different audience conditions: Half are told that only they need to remember the phrases (Self Directed), and the other half are told that they plus a partner (via video recording) need to remember the phrases (Self & Other Directed). Memory performance is tested immediately and one week later.

## Results

Preliminary analyses on 18 participants in the Self Directed condition revealed that the Verbal+Gesture condition produced better immediate memory scores (47%) than the Verbal Only condition (20%),  $t(17) = 4.26$ ,  $p < .001$ . In analyzing the remaining data, we expect the enactment effect to be equal in strength for the Verbal+Gesture and Verbal+Action conditions on the immediate memory test, but at delayed recall, we expect the Verbal+Gesture condition to produce significantly higher memory scores than the Verbal+Action condition. In addition, we expect that the presence of a partner in the Self & Other Directed condition will increase performance for participants in the Verbal+Gesture condition in both memory tests, without yielding a significant effect on participants in the Verbal+Action or Verbal Only conditions.

## Discussion

Preliminary results support the previous literature showing that gestures facilitate memory for speech. If gestures facilitate memory to a greater extent than actions, it would indicate that gesture enhances memory processes as a result of the unique integration process of gesture and speech. Moreover, if the present enactment effect with Self Directed gestures is further strengthened when using Self & Other Directed gestures, it would highlight gesture's inherently communicative nature, further supporting claims that gestures are especially designed for speech. In contrast, if gesture and action are equally effective in producing the enactment effect for oneself and others, it would suggest that gestures may not play such a privileged role in language production and memory.

**Keywords:** Co speech gesture, enactment, memory, action, audience design



# A multidimensional and cross-cultural study of musical gesture

Fabrice Marandola <sup>1,2</sup>, Farrokh Vahabzadeh <sup>1,3</sup>, Frederic Marin <sup>4</sup>, Marie-France Mifune, Khalil Ben Mansour, Mélissa Moulart <sup>4</sup>

<sup>1</sup> Eco-anthropologie et Ethnobiologie, MNHN, Sorbonne Universités (UMR 7206) – Muséum National d'Histoire Naturelle (MNHN) – Eco-anthropologie et Ethnobiologie, UMR 7206, Site du Musée de l'Homme, 17 place du Trocadéro, 75016 Paris, France <sup>2</sup> Senior research Chair Gesture-Acoustics-Music (GeAcMus) – Sorbonne Universités – France <sup>3</sup> Junior research Chair Gesture-Acoustics-Music (GeAcMus) – Sorbonne Universités – France <sup>4</sup> Biomécanique et Bioingénierie – Université de Technologie de Compiègne, CNRS : UMR7338 – Département Génie Biologique UMR6600 Biomécanique Biomédical - BP 20529 60205 COMPIEGNE CEDEX, France

This symposium is based on the outcome of a research project dedicated to the study of musical gesture (GeAcMus " Gesture-Acoustic-Music ", Sorbonne Universités). Grounded on a multidimensional approach bringing together ethnomusicologists, historical musicologists, acousticians, biomechanists, performers and music pedagogues, this project offers a unique comparative perspective on the topic of musical gesture.

Musical gesture is more than merely a mean to produce sound: it is the result of both instrumental constraints (mechanical, acoustical, ergonomic) and artistic choices, while simultaneously reflecting sociocultural values. The identifying marker of a sociocultural group or of a school of practice, musical gesture might also bear the unique signature of a single performer.

The aim of the project is threefold:

- 1° To study the playing technique of an instrument according to its functional, aesthetic and socio-cultural dimensions. Our approach includes: a) the analysis of the morphology and manufacturing of the instrument and its acoustics, b) the quantitative and qualitative analysis of musical gesture, c) a comprehensive knowledge of the musical language and its related learning processes, d) and the cultural representations associated with instrumental practices.
- 2° To develop new experimental methods to collect and analyze musical gesture data. Our approach focus on the study of instrumental gesture in various contexts of production ranging from laboratory conditions to field research in Central Africa and Central Asia, to live performances in French conservatories. Our data collection includes interviews with performers and instrument makers, audio recordings, 2D and 3D motion captures, and eye-tracking measurements.
- 3° To compare four types of instruments (drum, percussion keyboard, lute, harp) from different geo-cultural areas (Europe, Central Asia, Central and West Africa). The aim is to understand the different principles underlying the interactions between the musicians and their instruments. For each instrument, our research involves comparisons within each geo-cultural area, and between areas.

Our presentation includes a brief overview of the research project, the methodology on 3D motion capture, followed by three complementary case studies:

- 1/ 3D motion analysis of the performance of expert musicians - Frédéric Marin, Khalil Ben Mansour, Melissa Moulart, Farrokh Vahabzadeh, Marie-France Mifune, Fabrice Marandola
- 2/ Being a Drummer: What Stroke- and Gaze-Patterns Reveal in the Comparison of Performance Techniques of African and Western percussionists - Fabrice Marandola
- 3/ The dot'ar in Iran and Central Asia: The Embodiment of a Musical Signature - Farrokh Vahabzadeh
- 4/ Defining Cultural Boundaries through Harp Performance: Comparison of Musical Practices

## Symposium Marandola et al.: A multidimensional and cross-cultural study of musical gesture

Related to bwiti Cult in Three Gabonese Populations - Marie-France Mifune In conclusion, this research project elaborates a methodological approach to the study of musical gesture. This comparative and interdisciplinary study allows us to better demonstrate the relationships between the musical gesture, the instrument and the music according to its cultural meaning.

Keywords: musical gesture, instrumental gesture, motion capture, ethnomusicology, crosscultural studies, biomechanics, music, interdisciplinary studies





## 3D motion analysis of the performance of expert musicians

Frederic Marin <sup>1</sup>, Khalil Ben Mansour, M'elissa Moulart, Farrokh Vahabzadeh, Marie-France Mifune, Fabrice Marandola <sup>2</sup>

<sup>1</sup> Biomécanique et Bioingénierie – Université de Technologie de Compiègne, CNRS : UMR7338 – Département Génie Biologique UMR6600 Biomécanique Biomédical - BP 20529 60205 COMPIEGNE CEDEX, France <sup>2</sup> Schulich School of Music of McGill University, Montreal, Canada – Canada

3D motion capture readily allows to quantify and analyze human posture and movement. Motion analysis embraces various application domains such as sports, health, human engineering, videogames, and also music playing. In the framework of an interdisciplinary project between bio-mechanics and ethnomusicologists, a gabonese harp, a long-necked lute dot'ar, and a xylophone have been studied. We aimed at gathering quantitative data on the musicians motions when playing an instrument. Such data could allow for the qualification of the performance in particular in terms of precision and reproducibility. Primarily, the research teams had to define common semantics. Concerning the protocol, motion-tracking markers have been placed upon expert musicians, allowing 3D tracking of the trajectories of both full body segments and hand and finger motions separately, as well as contact force on the ground. To do so, we used the motion capture platform from the Université de Technologie de Compiègne providing optoelectronic technology including a set of 36 cameras and 2 force plates. Spatial temporal data were processed to quantify and qualify segmental posture and coordination. Each instrument and practice has its specificities requiring the adaptation of pertinent localization of the markers on the body segments, also landmarks had to be updated. Consequently, for the Gabonese harp, the motion capture protocol was focused on right-left hand coordination. For the lute dot'ar it was the manner to touch the cords and the upper limb displacement to produce sound that have been analyzed. Finally, for the xylophone, it was the upper body movement, the localization of the stick hit and the center of mass of the musician that have been explored.

For each instrument, these specific parameters have been analyzed for basic instrumental playing and for several reference melodies at normal and slow pace, simulating a beginner level. Finally, the musician was asked to mimic the play the reference melody without the instrument. For all instruments, results demonstrated a high skillfulness of the spatiotemporal motion coordination which could be shown by accurate and reproducible hand placement or segment displacements. Consequently expert musicians can be compared to elite sportsmen. We propose that the neuro-musculoskeletal system may have adapted, through extensive practice, to producing an optimized performance. The present study has been performed in a laboratory-controlled environment. We plan to investigate the same parameters in an ecologic environment in order to take into account changes due to specific context such as ritual or concert. This interdisciplinary investigation was very rich due to close cooperation between musicians, researchers in ethnology and biomechanics, and the results will be used for understanding how playing music could be quantitatively described.

Keywords: Motion capture, expert musicians





# Being a Drummer: What Stroke- and Gaze-Patterns Reveal in the Comparison of Performance Techniques of African and Western percussionists

Fabrice Marandola <sup>1,2,3</sup>, Frederic Marin <sup>4,5</sup>, Khalil Ben Mansour <sup>4</sup>, Mélissa Moulart <sup>5</sup>, Marcelo Wanderley

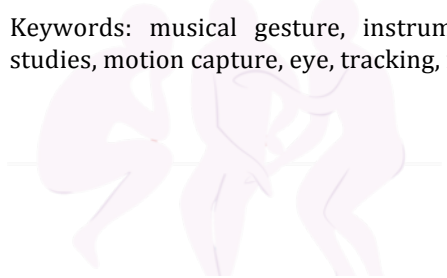
<sup>1</sup> Senior research Chair Gesture-Acoustics-Music (GeAcMus) – Sorbonne Universités – France <sup>2</sup> Eco-Anthropologie et Ethnobiologie (EAE) – CNRS : UMR7206 – Dpt Hommes Natures Sociétés 17, place du Trocadéro, 75116 Paris, France <sup>3</sup> McGill University - Schulich School of Music and CIRMMT (Centre for Interdisciplinary Research in Music Media and Technology) – 555 Sherbrooke Street West, H3A 1E3 Montréal QC, Canada <sup>4</sup> Sorbonne Universités, Université de Technologie de Compiègne, UMR CNRS 7338 : Biomécanique et Bioingénierie (BMBI) – Université de Technologie de Compiègne – 60200 Compiègne, France <sup>5</sup> Biomécanique et Bioingénierie – Université de Technologie de Compiègne, CNRS : UMR7338 – Département Génie Biologique UMR6600 Biomécanique Biomédical - BP 20529 60205 COMPIEGNE CEDEX, France

This research presents part of the results of a larger project dedicated to the study of instrumental gesture (Gesture-Acoustic-Music, Sorbonne Universités). Based on a comparative study of xylophonists and drummers from Mali (Malinke) and Cameroon (Bedzan, Tikar, Eton) on one side, and from Canada and France on the other side, my paper examines how the fundamentals of percussion performance are shaped by the morphology of the instrument, by the musical language, and by the cultural and social aesthetics associated with the instruments. The methodology involves several sets of data, collected in laboratory conditions (Université de Technologie de Compiègne, France, and Centre for Interdisciplinary Research for Music Media and Technology, Canada), and in the field, in Cameroon. 3D motion capture data was collected in laboratory conditions, while field recordings included a set of three Go-Pro Hero4-Black cameras placed in sagittal, frontal and transversal plans to collect complementary 2D data (with high-resolution capabilities in slow motion, i.e. recording at 240 frames per second). In both conditions, stereo or multi-tracks audio recordings were performed, and an eye-tracking device (ASL MEGX-60) was used to collect simultaneously gaze-data.

Despite the difference between the cultures selected for this research, the instruments share similar features: all the drums are performed standing up, and played with two beaters, while all the xylophones present a keyboard that is progressively tuned from low to high (this is not the case in several African areas). Moreover, the recordings involved a series of common musical tasks crossing cultural boundaries, completed by culturally specific musical works. Common tasks included single strokes, double-strokes, alternated strokes, and for xylophones double-stops in both parallel and contrary movements.

Analysis of 2D and 3D motion data helped to identify similarities and dissimilarities of stroke patterns for drums and xylophones, within each geo-cultural area and across areas. The combination of motion and gaze data revealed the existence of a strong correlation between specific stroke-patterns and eye-patterns, which is relatively independent from the influence of the learning context (oral tradition versus score-based learning). Combining the quantitative analysis with a qualitative approach to the socio-cultural context, we define what being a drummer means in each of the observed areas, and what strategies performers adopt to distinguish themselves from their peers within the boundaries of their own cultural groups.

Keywords: musical gesture, instrumental gesture, motion capture, ethnomusicology, crosscultural studies, motion capture, eye, tracking, music, interdisciplinary studies



# The dotâr in Iran and Central Asia: The Embodiment of a Musical Signature

Farrokh Vahabzadeh<sup>1,2</sup>

<sup>1</sup> Junior research Chair Gesture-Acoustics-Music (GeAcMus) – Sorbonne Universités – France <sup>2</sup> Eco-anthropologie et Ethnobiologie, MNHN, Sorbonne Universités (UMR 7206) (MNHN) – CNRS : UMR7206, Musée National d'Histoire Naturelle - MNHN (France) – Eco-anthropologie et Ethnobiologie, UMR 7206, Site du Musée de l'Homme, 17 place du Trocadéro, 75016 Paris - France, France

A large part of the instrumental music results from a series of physical gestures performed by a person, the musician, on an object, the musical instrument. However, in the field of ethnomusicology, these gestures have rarely been the subject of study, until recently. Such a scholarly lacuna may be the result of the privileging of musical sound over physical gesture. This article examines, through a study of the playing techniques of the dotâr (also called dutâr or dut'or), a long-necked two-stringed lute from Iran and Central Asia, how musical gestures can serve as a bridge between the music and anthropological dimension of music. The paper approaches the question of musical gesture in a particular angle of the comparative study of the instrumental playing gestures and techniques, combined with the question of the body. We start with a comparative study of dotâr playing techniques, by trying to define the complete inventory of gestures and techniques used to play the instrument in each tradition. Our approach focuses on the study of instrumental gesture in various contexts of production ranging from laboratory conditions (Université de Montréal, Canada, and Université de Technologie de Compiègne, France) to field research in Iran and Central Asia. Our data collection includes interviews with performers, video recordings, 2D gesture analysis and 3D motion captures and analysis. Our approach uses an adaptation of the methods mainly used in linguistics, specially the paradigmatic analysis, applied to the domain of musical gestures study.

The results of our analysis show that alongside the series of common playing techniques, we can find some techniques that are associated with a specific tradition and which can not be found in the other neighbouring traditions. So in a broad continuum which includes various musical traditions, or even wider, different cultural areas in contact, some techniques are the "distinctive features" which allows to distinguish between different traditions. However each musician develops his technique to create his own "signature", which can also be seen as a marker to distinguish between different musicians belonging to a same tradition.

In conclusion, the analysis of musical gestures can reveal not only the facts concerning interaction between man and the musical instrument but also, at the anthropological level, on how the musical traditions in contact, differentiate one from another by adopting a particular gesture in playing techniques or even a whole separate body posture. The identifying marker of a sociocultural group or of a school of practice, musical gesture might also bear the unique signature of a single performer.

Keywords: musical gesture, instrumental gesture, motion capture, ethnomusicology, cross, cultural, Speaker studies, embodiment, music, interdisciplinary studies, gesture analysis, gesture categorisation, Central Asia, Iran, dotâr



# Defining cultural boundaries through harp performance: Comparison of musical practices related to the bwiti cult in three Gabonese populations

Marie-France Mifune <sup>1</sup>, Frédéric Marin <sup>2</sup>, Khalil Ben Mansour <sup>2</sup>, Mélissa Moulart <sup>2</sup>

<sup>1</sup> Eco-anthropologie et Ethnobiologie, MNHN, Sorbonne Universités (UMR 7206) – Muséum National d'Histoire Naturelle (MNHN) – Site Musée de l'Homme, 17 place du Trocadéro 75016, Paris, France <sup>2</sup> Biomécanique et Bioingénierie, UTC, Sorbonne Universités (UMR 7338) – Université Technologique de Compiègne – Université Technologique de Compiègne, Rue du docteur Schweitzer CS 60319, 60203 COMPIEGNE Cedex, France

Based on a comparative study of several musicians playing the harp in Gabon, this paper aims to show that musical gesture is more than a mere gesture producing sound. Musical gesture is shaped both by instrumental constraints (mechanical, acoustical, ergonomic), and by the musical language and sociocultural values associated to the harp. The eight-string harp is a fundamental component of the bwiti cult. It is the messenger between the human and spiritual worlds.

Several populations in Gabon practice the bwiti cult. It has been transformed during its circulation among Tsogho, Myene and Fang populations. We also observe variations of the ritual among communities within each group of populations.

Due to its key role in the bwiti cult, the harp is shared among the different bwiti communities and populations. Borrowing and using the same instrument in the same ritual context could lead musicians to borrow the musical language and meaning associated. This is not obviously the case here. Indeed, we previously observed variations of the shape and decoration of the harp, but also of its repertoire and associated meanings. What about the musical gesture?

We studied and compared the musical gesture of several harpists from different communities to interrogate how the circulation of the same instrument allows bwiti communities to build a shared identity, albeit distinct.

By studying the instrumental gesture of several musicians, can we identify an instrument, gesture and acoustic signature of the harp of the bwiti cult? Can we also identify markers of different "schools of practice" and/or signature of singular performers?

For each musician, we collected and analyzed 2D and/or 3D motion data to identify similarities and dissimilarities of the musician's posture and the kinematic of his hands and fingers in different context (learning process, rehearsal, ritual). We then correlate the quantitative and qualitative analysis of musical gesture with the analysis of musical language and its related learning processes. We also studied the playing technique of the harp according to its functional and socio-cultural dimensions.

Based on this multidimensional analysis of the instrumental gesture, we aim to demonstrate the close relationships between the 3 fundamental elements underlying the performance of the harp: the instrument, the musical gesture, and the music. It is through the interrelation of the instrument, the musical gesture, the music and associated meaning that each musician builds his own identity.

Keywords: musical gesture, harp, performance, ritual, bwiti, Gabon, motion capture, identity construction, multimodality, interdisciplinarity

# A professional touch: Touching objects and persons as work in interaction

Lorenza Mondada

University of Basel – Switzerland

The sense of touch has recently generated an increasing interest in interactional studies (see pioneering work by M.H. Goodwin, Cekaite and Nishizaka). It can be considered as a necessary expansion of the research on multimodality, conceived as implicating the entire body and all senses. Moreover, the first interactional studies to deal with touch have primarily focused on touching persons; recent research on objects (see Nevile et al, eds, 2014) has also put in the forefront the importance of touching objects.

This panel aims at exploring further developments of this field, with a specific focus: touch in professional interactions. Professional settings are interesting in this respect because they involve a professional (vs. interpersonal) relation between the co-participants, as well as rights and obligations to touch that are shaped by the professional activity, and indeed reflexively accomplished as professional. This concerns persons (e.g. medical practitioners' touch of the body – see Heath 1986 on medical consultations; Nishizaka & Sunaga 2015 on massage) as well as objects (e.g. art dealers' touch of a piece of art). In both cases, professional touch exhibits not only exclusive rights to touch, but also ways of touching that display know how and expertise.

The papers of this panel contribute to a better understanding of this professional touch in very different contexts. The first paper concerns touching a part of the client's body: Touching the customers' hairs in an hairdressing salon is part of the professional service and is operated in ways that cannot be mistaken with a personal touch (Paper 1/De Stefani & Horlacher). The two other papers concern touching objects as part of the ongoing work: Touching objects as part of work of designing them, of feeling and imagining actual and possible features within discussions among designers (Paper 2/Nevile, Landgrebe, Wagner); Touching food as part of the work of selling it, in cheese shop encounters in which the cheese-seller exhibits his expertise not only in words but also in embodied ways, delicately exhibiting the properties of the product through the way it is palpated (Paper 3/Keel, Mondada, Monteiro, Svensson, van Schepen).

These papers contribute to the investigation of professional touch, by working on understudied institutional settings (design, hairdressing, gastronomy) and by covering a variety of languages (French, Danish, English, Italian, German, Dutch, Portuguese). The fact that professional touch is exhibited as such and in its specificity makes it an exemplary practice to be explored within multimodality and gesture studies.

Composition of the panel

De Stefani & Horlacher, Embodied correction: Gestural and tactile practices in hair salon interaction

Nevile, Landgrebe, Wagner, Handling fabric for demonstrations in professional dress design

Keel, Mondada, Monteiro, Svensson, van Schepen, Palpating cheese: Professional vs. lay touch in cheese shop encounters Greco, Discussant

Keywords: conversation analysis, touching, multimodality, video, professional interactions, institutional interactions



## Embodied correction: Gestural and tactile practices in hair salon interaction

Elwys De Stefani<sup>1</sup>, Anne-Sylvie Horlacher<sup>2</sup>

<sup>1</sup> KU Leuven – Faculteit Letteren, Department of Linguistics, Blijde-Inkomststraat 21, bus 3308, 3000 Leuven, Belgium <sup>2</sup> University of Basel – Französisches Seminar, Maiengasse 51, 4056 Basel, Switzerland

Hairdressing has been described as one of few service encounters during which the service provider is allowed to touch the client (Jacobs-Huey 2006) in such a way that prevents participants to treat haptic contacts as a manifestation of intimacy (M. H. Goodwin 2015). It is generally seen as an expert practice that hairdressers recurrently accomplish as they take care of a client's hair. In this contribution, we measure such general observations against a detailed, sequential analysis of tactile practices that both hairdressers and clients carry out. We zoom in on gestural and tactile resources that participants employ in corrective environments, i.e. when participants orient to revision of the haircut (Oshima 2007, 2009). While revisions can occur at any moment of the encounter, their initiation is sensitive to sequential and interactional contingencies. Hairdressers may orient to possible revision in the course of their work, e.g. by asking *c'est juste là?* 'is it right there?' while parting the client's hair. The sequential organisation of a hair-care encounter provides a specific slot for clients to request revision of the hairdo, namely at the end of the encounter, when hairdressers invite the client's assessment of the cut (*c,à va comme c,à?* 'is it ok like that?'). In both cases, it is the hairdresser's question that gives rise to a request for revision, which is therefore invited by the professional. However, clients can also initiate a revision without having been invited to do so. This is typically observable in moments in which hairdressers briefly disengage from the encounter. While on some occasions clients may formulate revisions merely through talk, in many cases they use their hands to point, displace problematic strands of hair, etc. While both participants treat the former practice as legitimate, the latter is recognisably dispreferred: Indeed, clients systematically provide accounts for their manual intervention, whereas hairdressers immediately co-participate in rearranging the hair, while at the same time accounting for the particular circumstances. Requests for revision hence appear as an exemplary phenomenon in which both participants work towards adjusting the hairdresser's professional vision (C. Goodwin 1994) to the client's vision of her/himself. Our analyses thus allow us to shed light on how participants mobilise and cope with diverse territories of knowledge (Heritage 2012) and competence. Furthermore, our findings feed into recent work on haptic practices in directive sequences of interaction (Cekaite 2015). We use conversation analysis and multimodal interaction analysis as methods of investigation and analyse video recordings collected in hair salons located in the French speaking part of Switzerland (18 sessions involving 18 clients and 6 hairdressers, 16 hours in total).

Keywords: interaction, conversation analysis, multimodality, touching, correction, hairdressing



# Handling fabric for demonstrations in professional dress design

Maurice Nevile, Jeanette Landgrebe, Johannes Wagner

University of Southern Denmark – Denmark

We explore the ways in which a professional dress designer touches and handles fabric during final fitting sessions to prepare a competitive dance dress. The main participants are the designer, the dancer, and a dance instructor. During these sessions the participants decide on features and ornamentations of the dress to ensure it fits the dancer's individual body and will meet the particular demands of future dance performance. An important part of the sessions is to make and act on suggestions for possible changes to the dress, and identify potential problems. The designer, especially, touches the dress to the dancer's body to demonstrate how the dress might appear and function while worn. We note a wide range of forms of touching, including holding/releasing, stretching, smoothing/sliding, folding, turning, rolling, pulling, lifting, and sometimes cutting/unpicking [unstitching]. We consider how these different touching forms realise the conduct of demonstrations, for example their initiation, progress, support (evidence for claims), and how they are received and understood by relevant others. Our corpus includes 20 hours of video recorded interactions and design activities, and ethnographic field notes, collected in cooperation with a Danish fashion design firm (data in Danish/English). Recordings were made with a single hand-held camera. In analytic approach to gesture we are particularly informed by the concerns of ethnomethodology and conversation analysis for the locally achieved organization of social interaction and activity, especially for the coordination of talk, embodiment and materiality.

Keywords: conversation analysis, creativity, design, embodiment, ethnomethodology, interaction, touch





## Palpating cheese: Professional vs. lay touch in cheese shop encounters

Sara Keel, Lorenza Mondada, David Monteiro, Hanna Svensson, Nynke Van Schepen, Burak Tekin

University of Basel – Switzerland

This paper is interested in the social organization of touching products as exhibiting expertise in professional and service encounters – with a particular focus on practices for palpating cheese as part of the professional work of the cheese seller. Recently, an interest for the sense of touch has been emerging within interactional studies: some pioneering research has dealt with touching the other in ordinary interactions (Goodwin 2013, Cekaite 2010, 2015) as well as in professional encounters (Heath 1986, Nishizaka, 2007, Nishizaka & Sunaga 2015). Complementary analyses of touch rather concern objects: touching objects (in the sense of feeling them, palpating them vs. just manipulating them) constitutes a set of practices that characterize several settings and in particular gastronomy – as explored in this paper. Touching food is a recurrent practice in cooking (Mondada, 2014) but also buying products (De Stefani, 2010); in institutional settings, it can be achieved in such a way that exhibits know-how, expertise and knowledge. The paper addresses this professional touch by focusing on a large video data set of service encounters in cheese shops recorded in Europe. Within the ongoing transaction, the seller often engages in touching a piece of cheese, in such a way to display and evaluate the features of the product (ripeness, softness, maturing [fr. affinage]). This touch is done in a delicately exhibited way, both manifesting the expertise of the seller and demonstrating the quality of the cheese. Although the customer does generally not touch the product, touching is organized as an intersubjective practice, involving not only private feelings but publicly visible gestures. Moreover, in the data set, some cheese sellers invite the customer to touch too, sharing the feeling and not only the result of the examination – in instances of socialization of touch. The analysis explores both how professional touch is publicly exhibited, skillfully placed within the description of the product, and how invitations (vs. prohibition) to touch and share feelings and knowledge are achieved with the customer.

Keywords: conversation analysis, multimodality, touching, tasting, food, shop encounter

Discussant: Luca Greco





# Gesture production in virtual pedagogical agents

Mitchell Nathan

University of Wisconsin-Madison [Madison] – Madison, WI 53706, United States

Learning and teaching are social and embodied. Gesture, therefore, plays a valuable role in the design of effective learning environments. This thematic panel brings together scholars from a variety of institutions and scholarly perspectives to present research on the nature of gesture as it is implemented in avatars and virtual pedagogical agents for mathematics and language learning. People regularly and spontaneously engage their hands and arm movements along with speech as part of their communication. These gestures are ubiquitous during natural conversation (Kendon, 2004; McNeill, 1992). In addition, a meta-analysis of 63 studies (Hostetter, 2011) concluded that speakers' gestures benefit listeners' comprehension, especially children. Gestures are also prevalent during classroom instruction (Alibali et al, 2014; Richland et al., 2007). Furthermore, teachers regulate their use of gestures to suit the needs of their students (Alibali & Nathan, 2007; Alibali et al., 2013). Instruction that incorporates effective gesture practices can foster greater learning than lessons without it (e.g., Church, Ayman-Nolley & Mahootian, 2004; Alibali et al., 2013). So it is natural that designers of digital learning environments investigate virtual pedagogical agents that incorporate use of effective instructional gestures.

Each of the panelists is developing rich theoretical, methodological, and practical aspects of gesture research for advancing our understanding of the design of effective learning environments. In addition to presentations on the power of gesture to enhance learning, comprehension, and transfer, this session will explore two crosscutting topics important to the advancement of virtual pedagogical agents:

Topic 1. Gestures make ready use of resources in one's environment (e.g., one's body, objects and inscriptions, locations in shared space) to enhance comprehensibility and learnability. What makes gesture special for learning?

Topic 2. Instructional gestures for pedagogical agents can be encoded as general pedagogical principles (Paper 1); specific, verbally scripted actions (Papers 2 and 3); and image-based reenactments (Paper 4). How does the level of description used to encode pedagogical gestures influence student learning?

The first presenters (Alibali, Nathan, Popescu & Yeo) will describe empirically based principles of effective instructional gestures that drive the design of a virtual pedagogical agent for making connections among mathematical ideas and fostering common ground. The second (Pruner, Popescu, & Cook) presents findings showing enhanced learning, transfer, and generalization of arithmetic learning from the gestures produced by a virtual agent that integrates charismatic and cognitive considerations. The third (Bergmann, Aksu & Rosenthal-von der P'utten) shows enhanced language learning from a virtual pedagogical agent that uses iconic gestures. The fourth (Flood, Neff & Abrahamson) investigates animated-GIF banks to capture pedagogical gestures and communicate gestures to teachers. The assembled scholars each offer important insights into the power and challenges of integrating pedagogical gesture into the design of the next generation of digital learning environments.

Keywords: Pedagogical agents, teaching, linking gestures, instructional gesture, learning environments, online learning



# Effective Instructional Gestures: Design Principles for Virtual Pedagogical Agents

Martha Alibali<sup>1</sup>, Mitchell Nathan<sup>1</sup>, Voicu Popescu<sup>2</sup>, Amelia Yeo<sup>1</sup>

<sup>1</sup>University of Wisconsin Madison – United States <sup>2</sup>Purdue University – United States

Gesture benefits comprehension (Hostetter, 2013) and classroom learning (Alibali et al., 2013). As scholars and developers collaborate to design and implement virtual pedagogical agents for embodied, multimodal instruction, there is a need to identify principles for effective instructional gestures (Cassell, 2000). The literature covering naturalistic observational studies of teachers, laboratory research, and classroom teaching experiments supports several principles for effective gesture use. We focus here on three principles that guide the design of our virtual agent for mathematics instruction (Figure 1): Teaching is multimodal, with gestures playing a central role; pointing and highlighting index ideas to the world; and coordinated sequences of gestures are used to form links, which connect ideas and forge common ground with students. Together these principles provide guidelines for effective gesture in pedagogical avatars. First, teachers regularly use gesture as part of their multimodal communication to students (see Figure 2) (Edwards, 2009; Flevares and Perry, 2001; Roth, 2001). For example, when teachers communicate connections between mathematical ideas, they almost always express them multimodally, usually including gestures (Alibali et al., 2014). Furthermore, teachers increase their use of gestures when communicating new as compared to review material (Alibali et al., 2014), and when responding to students' expression of confusion or trouble spots (Alibali et al., 2013; Nathan & Alibali, 2011).

Second, teachers index ideas and representations to the world via pointing and other highlighting acts (Figure 3). These indexical forms relate ideas to objects and places in the learning environment (Alibali, et al., 2013; Richland, 2008). Indexical gestures are often ground abstract or unfamiliar ideas and inscriptions in the physical environment, in order to scaffold students' sense-making processes (Nathan, 2008; Walkington, et al., 2013). Consistent with scaffolding, the frequency of indexical gestures decreases (fading) as the ideas and inscriptions become more familiar to students (Alibali & Nathan, 2007).

Finally, teachers regularly coordinate multiple gesture-speech acts to establish links among mathematical ideas and representations (Figure 4). Links that specify relationships among ideas play a central role in mathematics lessons, because the meanings of mathematical entities often depend on relational semantics (Kaput, 1989). In a corpus analysis (Alibali et al., 2014), middle school mathematics teachers produced an average of more than 10 links per hour of instruction. Gestures served a linking function most often when mathematical ideas were first mentioned, even if they were part of a review, and when students encountered new, abstract information, such as a new formalism.

In this paper, we demonstrate how we have implemented these principles in the gestures of a computer-based avatar teacher, and we describe a program of research aimed at investigating the role of such gestures in student learning.

Keywords: learning, education, instruction, avatars



# The effect of temporal coordination on learning from speech and gesture

Todd Pruner<sup>1</sup>, Voicu Popescu<sup>2</sup>, Susan Wagner Cook<sup>1</sup>

<sup>1</sup>University of Iowa [Iowa] (UI) – Iowa City, IA 52242, United States <sup>2</sup>Purdue University – United States

Hand gesture can improve learning in children (Goldin-Meadow and Wagner, 2005). The beneficial effects of gesture can be seen in a number of domains, including language

development (Ozcaliskan & Dmitrova, 2013), number conservation (Ping & Goldin-Meadow, 2013), and mathematical equivalence (Cook, Duffy, & Fenn, 2013). In spite of gesture's beneficial effects, it is not clear exactly what it is about gesture that benefits learners. Gestures have a number of characteristics that might be especially useful for learners. Gestures represent information visually, using the body, and many researchers have hypothesized that gesture's benefit is due to its unique representational affordances. However, gestures are also temporally coordinated with speech and so some of their benefit might be due to their precise timing. We manipulated the temporal coordination of information across speech and gesture to assess whether learners are sensitive to the synchrony of information across modalities. We used an animated teaching agent (ATA) in order control for potential confounding factors including eye gaze, body position, and intonation, which typically covary with gesture. More importantly, by using an ATA, we were able to manipulate gesture timing while maintaining coordination of the lip movements and the spoken explanation.

Children participated in one of three gesture conditions. In the Original condition, we used stimuli based on Cook, Friedman, Duggan, and Cui (in press), which were previously demonstrated to benefit learning when compared with a non-gesturing ATA. The gestures in Cook et al. were timed to look natural according to the researchers' intuitions. In the Early or Late conditions, the timing of the gestures from the Original Condition was manipulated, with the gestures shifted 500 ms in either direction. After viewing the instruction, children completed three tests of understanding. Children wore a head mounted eye-tracker throughout the experiment.

For those children who were not successful on a pretest, children in the Early and Original conditions outperformed those in the Late condition,  $z = -1.73$ ,  $p = .08$  (see Figure 1). Children in the Early condition performed better than those in the Original condition, but this difference was not reliable.

These findings suggest that learners benefit most from gestures that are most like those spontaneously produced, where gestures anticipate, or coordinate with the accompanying speech. These findings also have clear implications for the design of instructional materials. The principle that visual information should not lag behind auditory information may apply more generally to multimodal instruction. Indeed, in studies of audiovisual integration, greater integration is seen when visual information precedes auditory information than the reverse (Sekuler, Sekuler, & Lau, 1997).

Keywords: Audiovisual integration, multimodality, math learning



# Vocabulary Learning with a Virtual Agent – The Role of Non-verbal Aids and Individual Differences

Kirsten Bergmann<sup>1</sup>, Volkan Aksu<sup>1</sup>, Astrid Rosenthal-Von Der Pu'tten<sup>2</sup>

<sup>1</sup>Bielefeld University – P.O. Box 100 131 D-33501 Bielefeld, Germany <sup>2</sup>University of Duisburg-Essen – Forsthausweg 2 D-47057 Duisburg, Germany

For the domain of foreign language vocabulary learning, increasing evidence suggests that iconic gesture performance together with a novel word, enhances learning and makes those words more resistant against forgetting (cf. Hald et al. 2015). At the same time the multimedia principle (Mayer 2009), stating that learning with textual content and pictures is more effective than learning with textual materials alone, has received robust empirical evidence also in the domain of vocabulary learning (cf. Butcher 2014). Along these lines, learning environments incorporating embodied agents provide a flexible way to support vocabulary learning with non-verbal means – be it by gestures or by pictures. A first study testing gesture-based vocabulary training with a virtual trainer actually showed similar beneficial effects on learning outcome as a real human trainer (Bergmann & Macedonia, 2013). Empirical evidence, however, to decide in favour of one or the other non-verbal aid, is rare and not fully conclusive (Tellier 2008; Rowe et al. 2013; Mayer et al. 2015). This might be due to different training or test procedures employed in the studies, but might also be caused by individual differences among learners. In fact, there is evidence demonstrating that learners' verbal skills and gender can modulate word learning performance (Rowe et al. 2013; de Nooijer et al. 2014). In the present study, we tested in how far individual language learning styles, suggested to be among the main factors that help determine [...] how well [...] students learn a second or foreign language" (Oxford 2003, p. 1), have an impact on the effectiveness of different non-verbal learning aids.

We conducted German-Finnish vocabulary training with a virtual human, combining a within-subject manipulation of training type (words+gesture, words+picture, words-only) with an assessment of participants' language learning style (Style Analysis Survey, Oxford 1990). The virtual human was present in all conditions. In the words+gesture condition, participants imitated the agent's iconic gestures. In the words+picture condition, participants additionally saw a picture depicting the words' meaning. Both gestures and pictures had been evaluated in a pre-test to be semantically congruent with the words to be learned. 30 participants learned 15 word pairs per condition in three sessions over three consecutive days. Learning performance was measured one day after each learning session, respectively (short-term measures) and again four weeks after the training period (long-term measure).

Results showed both short- and long-term effects of training type. In the short-term, gesture- and picture-enrichment outperformed the baseline, whereby memory performance differed by several dimensions of language learning style. In the long-term, however, gestures turned out to be most beneficial – irrespective of individual learning style. These findings further strengthen the role of gesture use in vocabulary learning, especially when it comes to sustain learning progress.

Keywords: Vocabulary Learning, Virtual Pedagogical Agents, Individual Differences



# Animated-GIF libraries for capturing pedagogical gestures: An innovative methodology for virtual tutor design and teacher professional development

Virginia Flood<sup>1</sup>, Michael Neff<sup>2</sup>, Dor Abrahamson<sup>1</sup>

<sup>1</sup> University of California, Berkeley (UC Berkeley) – United States <sup>2</sup> University of California, Davis (UC Davis) – United States

We report on a novel approach for archiving repertoires of multimodal pedagogical techniques that enlists animated Graphic Interchange Format (GIF) files. This methodology was developed by an interdisciplinary team of learning scientists (LS-team) and computer scientists (CS-team) building a virtual, animated, mathematics tutor capable of multimodal communication. Using an extensive video corpus of mathematics instruction, the LS-team identified a repertoire of pedagogical gestures for the CS-team to simulate virtually in the animated character. However, early on, the LS-team struggled to communicate this repertoire. Video clips of pedagogical gestures occurring “in the wild” were over-situated in the idiosyncratic spatial configurations of their environments (Goodwin, 2007) and could not delineate the generic, core specifications of the gestures to be reproduced. At the same time, the complex trajectories and morphologies of these gestures did not reduce well to verbal description with static images. Spontaneous, situated motion is notoriously difficult to inscribe (Guest, 1998). Of the various gesture classification schemes currently available (Kendon, 2004), none offer a level of specificity necessary for accurate three-dimensional, dynamic reproduction.

The solution we developed bypassed the need to represent gestures with either static inscription or in situ video clips. We created a digital library of animated-GIFs of re-enacted gestures (Figure 1) and succeeded in using this library to support an actor’s motion capture performance (Figure 2). By re-enacting gestures from the video corpus, we were able to create idealized, contextually generic forms of the spontaneous gesturing techniques we observed in learning settings. Animated-GIFs unequivocally convey the three-dimensional, dynamic details of each gesture, allowing a viewer to quickly and accurately learn the form. An unexpected benefit is that animated-GIFs also capture other critical semiotic resources of the multimodal Gestalts (Mondada, 2014) that accompany gesturing such as patterns of gaze and facial expressions (Streeck, 2009).

There is strong consensus that teacher gesture during instruction is essential for students’ learning (Nathan & Alibali, 2011), and therefore there is a growing need to develop materials to support teachers in effective use of multimodality in lessons. Currently, common gesture annotation systems - verbal narratives and static images with multiple elaborate arrows - leave too much spatio-dynamic information (e.g., trajectory) ambiguous. Teachers working from such illustrated scripts cannot faithfully re-enact the original movements. Animated-GIF libraries of re-enacted pedagogical gestures are clearly depictive, circumvent privacy issues, and can be stored in broadly accessible formats (e.g., web). Therefore, we believe our animated-GIF banks present exciting possibilities for productively disseminating pedagogical gesturing techniques directly to in-service and pre-service teachers as part of professional development.

Keywords: Multimodal instruction, virtual pedagogical agents, teacher education



# Factors modulating mode of representation: Evidence from sign, pantomime and co-speech gestures in hearing adults and speakers with aphasia

Gerardo Ortega

Radboud University and Max Planck Institute for Psycholinguistics (RU MPI) – Wundtlaan 1, Nijmegen, the Netherlands, 6525 XD, Netherlands

It is a well-established phenomenon that all forms of manual communication (sign and gesture) adopt iconic forms that mimic the physical appearance of a referent. Despite a myriad of empirical studies investigating the role of iconicity in gestural and signed communication not much attention has been paid to the factors that modulate the form of these iconic depictions. There is general consensus of at least four main modes of representation: acting (or handling) denotes how an object is manipulated; representing (or instrument) uses the hand to recreate the form of an object; drawing (or tracing) describes the outline of a referent; and moulding depicts the three-dimensional characteristics of an object (Müller, 2013). Beyond different taxonomies describing the modes of representation that gestures and signs can adopt, it remains unclear what factors motivate certain techniques over others. The aim of this symposium is to address this question and provide a comprehensive overview of some of the factors that have shown to influence the mode of representation of iconic manual forms. The proposed symposium brings together an international group of sign linguists, psychologists, and gesture experts investigating some of the factors that modulate representational techniques in manual communication. In doing so, we break the common misconception that the form of iconic depictions is unsystematic, and put forward evidence showing that mode of representation is tightly linked to factors such as semantic category, affordances of the referent, type of task, stimuli presentation, and population. More specifically, these talks will give evidence showing that gesturers favour a default mode of representation (handling), which differs from the strategy typically exploited by signers (instrument). Further, while signers show tendencies towards certain techniques, comparisons across sign languages show that there are also typological differences. We will also discuss that signers and gesturers have the communicative need to make distinctions between semantically related concepts and thus use specific techniques of representation to discriminate verbs from nouns. We will also show that some semantic categories elicit specific techniques of representation and these are further modulated by the way in which stimuli are presented. Finally, we will discuss how specific impairments in people with aphasia affect the ability to use these representation techniques. The symposium will conclude with a discussion chaired by Prof. Cornelia Müller, keynote speaker of ISGS 7 and leading scholar on the modes of representation. Her expertise on the topic will offer an invaluable perspective of the factors that influence mode of representation in light of the new data.

Keywords: modes of representation, iconicity, sign language, co, speech gesture, pantomime, aphasia, deictics, affordances, semantic categories





# The influence of stimuli presentation on gestural depictions of objects

Ingrid Masson-Carro, Martijn Goudbeek, Emiel Krahmer

Tilburg University [Tilburg] – PO Box 90153, 5000LE Tilburg, Netherlands

Speakers often rely on iconicity (resemblance between a form and its referent, Perniss & Vigliocco, 2010) to gesturally depict attributes of referents, such as shape (e.g., “sculpting” the contour of an object) or function (e.g., demonstrating the use of a tool). Despite the considerable advancement in our understanding of co-speech gestures, we know little about the factors motivating the specific form gestures adopt. Recently, researchers have approached this issue by studying the use of representation techniques (Müller, 1998), uncovering preferences in the way speakers manually depict objects (van Nispen et al., 2014; Padden et al., 2015; Masson-Carro et al., 2015). For instance, speakers tend to depict manipulable objects with handling gestures, and non-manipulable objects with moulding gestures. Importantly, the experimental research available has used imagistic representations as stimuli, thus it is hard to evaluate the extent to which these techniques depict conceptual knowledge.

In this paper, we explore the effects of imagistic (pictures) and lexical stimuli (words) on gesture production about objects differing in manipulability in a referential task. We hypothesized that when objects are presented imagistically (compared with lexically), speakers will more frequently rely on perceptually-based forms of iconicity (e.g., shape gestures); conversely, when speakers draw from conceptual representations, we should observe an increase in action-based iconicity (e.g., handling gestures).

We collected a corpus of 2205 multimodal descriptions from 45 speakers about objects rated by 60 naïve judges as highly-manipulable (e.g., tennis racket), less-manipulable (e.g., traffic light), and non-manipulable (animals). We categorized all gestures into representational and non-representational (McNeill, 1992), and annotated all representational gestures for representation technique. We annotated seven techniques: handling, enacting, moulding, enclosing, portraying, and placing (see Masson-Carro et al., 2015).

Our preliminary results partially support the hypotheses. Stimuli presentation influenced the gestural techniques, and this interacted with the degree of manipulability. Particularly, speakers who saw images (compared with words) exhibited a preference towards shape gestures (moulding, tracing) and gestures depicting spatial relations (placing), but only for non-manipulable objects. This suggests that variable visual characteristics of objects, such as shape, are more likely to be represented in gesture if the referent is perceptually accessible. Contrary to expectations, speakers in the lexical condition did not exhibit more handling gestures than speakers in the imagistic condition. Nevertheless, this highlights the idea that function is a highly salient attribute, easily accessible from both pictorial and lexical representations. In addition, our results showed that handling and moulding gestures occurred more frequently than any other technique. These techniques may reflect stronger motoric and haptic simulations, which could support activation-based gesture production accounts (Hostetter & Alibali, 2008).

At the presentation, we plan to discuss data from finer-grained semantic analyses, to further examine how different depiction modes are used in combination with speech.

Keywords: co, speech gesture, representation technique, iconicity





# Generalisable patterns of gesture distinguish semantic categories in communication without language: Evidence from pantomime

Gerardo Ortega, Asli Özyürek

Radboud University and Max Planck Institute for Psycholinguistics (RU MPI) – Wundtlaan 1, Nijmegen, the Netherlands, 6525 XD, Netherlands

There is a long-standing assumption that gestural forms are geared by a set of modes of representation (acting, representing, drawing, moulding) with each technique expressing speakers' focus of attention on specific aspects of a referent (Müller, 2013). However, it is just recently that the relationship between gestural forms and mode of representation has been linked to 1) the semantic categories they represent (i.e., objects, actions) and 2) the affordances of the referents. Here we investigate these relations when speakers are asked to communicate about different types of referents in pantomime. This mode of communication has revealed generalisable ordering of constituents of events across speakers of different languages (Goldin-Meadow, So, Özyürek, & Mylander, 2008) but it remains an empirical question whether it also draws on systematic patterns to distinguish different semantic categories.

Twenty speakers of Dutch participated in a pantomime generation task. They had to produce a gesture that conveyed the same meaning as a word on a computer screen without speaking. Participants saw 10 words from three semantic categories: actions with objects (e.g., to drink), manipulable objects (e.g., mug), and non-manipulable objects (e.g., building). Pantomimes were categorised according to their mode of representation and also the use of deictics (pointing, showing or eye gaze). Further, ordering of different representations were noted when there were more than one gesture produced.

Actions with objects elicited mainly individual gestures (mean: 1.1, range: 1-2), while manipulable objects (mean: 1.8, range: 1-4) and non-manipulable objects (mean: 1.6, range: 1-4) elicited primarily more than one pantomime as sequences of interrelated gestures. Actions with objects were mostly represented with one gesture, and through re-enactment of the action (e.g., raising a closed fist to the mouth for 'to drink') while manipulable objects mostly were represented through an acting gesture followed by a deictic (e.g., raising a closed fist to the mouth and then pointing at the fist). Non-manipulable objects, however, were represented through a drawing gesture followed by an acting one (e.g., tracing a rectangle and then pretending to walk through a door).

In the absence of language the form of gestures is constrained by objects' affordances (i.e., manipulable or not) and the communicative need to discriminate across semantic categories (i.e., objects or action). Gestures adopt an acting or drawing mode of representation depending on the affordances of the referent; which echoes patterns observed in the forms of co-speech gestures (Masson-Carro, Goudbeek, & Krahmer, 2015). We also show for the first time that use and ordering of deictics and the different modes of representation operate in tandem to distinguish between semantically related concepts (e.g., to drink and mug). When forced to communicate without language, participants show consistent patterns in their strategies to distinguish different semantic categories.

Keywords: Pantomime, iconicity, deictics, affordances, semantic categories



# How different iconic gestures add to the communication of PWA

Karin Van Nispen<sup>1</sup>, Mieke Van De Sandt-Koenderman<sup>2,3</sup>, Kazuki Sekine<sup>4</sup>, Emiel Krahmer<sup>1</sup>, Miranda Rose<sup>5</sup>

<sup>1</sup>Tilburg Center for Cognition and Communication, Tilburg University, Tilburg – Netherlands <sup>2</sup>Erasmus MC, Inst Rehabilitation Medicine, Rotterdam – Netherlands <sup>3</sup>Rijndam Rehabilitation Center, RoNeRes, Rotterdam, the Netherlands – Netherlands <sup>4</sup>Departments of Psychology, University of Warwick, Coventry, the United Kingdom – United Kingdom <sup>5</sup>School of Allied Health, La Trobe University, Melbourne, Australia – Australia

**Introduction** Gestures can convey information in addition to speech (Beattie et al., 1999). In the absence of conventions on their meaning (McNeill, 2000), people probably rely on iconicity, the mapping between form and meaning, to construct and derive meaning from gesture (Perniss et al., 2010). This informative function of gesture seems useful for people with aphasia (PWA). As a result of brain damage, PWA may encounter severe language production difficulties (Bastiaanse, 2010), and resulting communication disability. Although PWA can use gestures, some use them differently from non-brain-damaged people (NBDP) (Sekine et al., 2013a; Sekine et al., 2013b). Van Nispen et al. (2015) have shown that, when having to depict objects silently, PWA rely more on gestures that depict the shape of an object as compared to NBDP, who more often show how they would use an object. The present study aimed to find out how PWA use these various iconic representation techniques in semi-spontaneous conversation and how important these gestures are for their communication.

## Methods

**Participants.** Videos of semi-structured interviews with 42 PWA and 9 NBDP from AphasiaBank (MacWhinney et al., 2011) were analyzed for the gestures used. These were coded in two classifications: a) type of iconic gesture and b) communicative value. In addition to the labels identified by Sekine et al. (2013b), we specified five representation techniques: handling, enact, object, shape (see Van Nispen et al., 2015b) and path (see Cocks et al., 2013). Based on Colletta et al. (2009) we determined the communicative value of each gesture. The information in gesture was coded as: ‘Conveys information.....’ 1) similar to information in speech, 2) additional to speech, and 3) that is absent in speech and essential for understanding the communicative message (see van Nispen et al., 2015a).

## Results

Our preliminary results indicate no differences for the use of different iconic gestures between NBDP and PWA or between aphasia types. Figure 1 shows for the gestures used by PWA, that concrete deictics and iconic character viewpoint gestures were proportionally most often essential. Also, a large proportion of emblems were essential. Within the category of ICV gestures, both enact and handling gestures were often essential (Figure 2).

## Discussion

Our study showed that PWA’s gestures convey information essential for their communication. This is particularly the case for, concrete deictics, handling and enact gestures, but possibly also for shape gesture. Contrary to previous findings for pantomime (Van Nispen et al., 2015b), at a group level, we did not find significant differences between NBDP and PWA, possibly, due to individual variability. At the workshop we plan to present detailed analyses focusing on explaining the importance of these individual differences.

**Keywords:** Iconicity, co, speech gesture, aphasia





# Systematicity in iconic representation: From gesture to sign language

Carol Padden<sup>1</sup>, Ryan Lepic<sup>1</sup>, So-One Hwang<sup>1</sup>, Simon Kirby<sup>2</sup>, Tessa Verhoef<sup>1</sup>

<sup>1</sup>UC San Diego – United States <sup>2</sup>University of Edinburgh – United Kingdom

Research examining silent gesture forms produced by hearing non-signers has shown that, when asked to provide a gesture label for a man-made hand-held object, they typically use a form in which the hand resembles a human hand manipulating the object. In addition to these handling forms, non-signing gesturers also produce instrument forms, in which the hand additionally resembles the manipulated object, but at much lower rates (Padden et al. 2013). Sign languages also use handling and instrument forms in order to create lexical items, however, the two representational strategies are used in different proportions and can be associated with different functions. For example, in American Sign Language (ASL), instrument forms are more common overall, and are used more often for naming hand-held tools than in the silent gestures of hearing non-signers, while handling forms are more often used specifically to encode verbs associated with using hand-held tools (Padden et al. 2015).

This systematic alternation between handling and instrument forms of iconic representation in sign language is an example of patterned iconicity. A long-standing theme in sign language research has been the demonstration that, despite their apparent iconicity, lexical signs are arbitrary linguistic symbols (Frishberg 1975, Klima & Bellugi 1979). However, a number of researchers now argue that iconic and arbitrary symbols alike can be systematically organized in human language, both signed and spoken (Perniss et al. 2010, Dingemanse et al. 2015).

Here we propose that the increased use of the instrument strategy in ASL is the result of boosting an iconic strategy already available in gesture, and assigning it a grammatical function in an organized linguistic system. Two predictions follow from our proposal: 1) Though gesturers prefer the handling form as a "default", they can be persuaded to prefer instrument forms instead, when the functions of handling and instrument forms are manipulated in an experimental context, and 2) different sign languages may vary with respect to whether they assign a specialized function to the instrument strategy as a patterned alternative to the handling strategy.

We present data that support both predictions. In a laboratory experiment, we show that non-signers can be persuaded to favor a pattern in which the instrument, rather than the default handling form, is the more commonly used to refer to actions associated with hand-held tools. In an elicitation task with signers of New Zealand Sign Language, we show that NZSL signers use handling forms for both nouns and verbs, unlike ASL, which preferentially uses instrument forms for nouns and handling forms for verbs. The comparison of iconic strategies as used in sign languages in the real world and gesture systems in the laboratory can thus reveal how iconicity is taken up and made systematic in language.

Keywords: sign language, silent gesture, patterned iconicity



# Gesture, gesture: Tracking gestures across repetitions

Eric Pederson, Prakaiwan Vajrabhaya

University of Oregon – United States

This panel brings together a number of researchers from multiple countries who all use the experimental paradigm of having speakers repeat references to objects and events – both in narratives and in other communicative tasks. The common element in all of this research is a comparison of first and subsequent mentions (reduction/non-reduction in size, frequency, communicative value, type, duration, and/or precision). Studying change in gesturing across multiple mentions gives insight into the role of gesture in production and/or the role of the listener in the speaker's gesturing. This in turn allows a better understanding of the communicative function of gesture, its role in speech production, and the role of interaction between speaker and listener.

There are two primary goals of this panel:

- 1) To compare and evaluate the differing methods each group uses within this paradigm and to better understand how varying results follow from the differences in methods.
- 2) To gain a clear understanding of the role of previous mention, interaction, and motoric and speech planning automatization; plus the vital role that gesture has in elucidating these. To what extent and under what conditions does the speaker modify her behavior depending on the speaker's model of the listener's state of knowledge or the listener's backchannel behavior?

Schedule (assuming 1h50m block)

10 minute Introduction

Description of the relevance of repetition studies to models of gesture production.

4 talks of 20 minutes each (each talk has a separately submitted abstract). With a few questions immediately after each talk, but general questions postponed to the final discussion.

Paper 1 "Two replications of given-new effects on gestural duration"

Paper 2 "Partner-specific attenuation across retellings informs models of speech and gesture production"

Paper 3 "Teasing apart listener-sensitivity: The role of interaction" Paper 4 "Using different gesture rate metrics when studying gesture production in repeated references" 20 minute final panel discussion and general questions.

Keywords: Repetition, gesture reduction, experimental methodology



# Partner-specific attenuation across retellings informs models of speech and gesture production

Alexia Galati, Susan Brennan

University of Cyprus [Nicosia] – P.O. Box 20537, 1678 Nicosia, Cyprus

In dialogue, speakers tend to attenuate old, repeated, or predictable information but not new information. A current debate concerns whether this attenuation unfolds with the addressees' knowledge and needs in mind (for-the-addressee) (e.g., Hanna, Tanenhaus, & Trueswell, 2004; Metzinger & Brennan, 2003), or whether it is an automatic process by which speakers do what is easiest for themselves (for-the-speaker) (e.g., Keysar, Barr, Balin, & Paek 1998). A parallel debate in the study of gesture concerns the extent to which gestures are produced with communicative intentions in mind (e.g., Bavelas, Chovil, Lawrie, & Wade, 1992; Özyürek, 2002), or else are produced automatically by speakers to facilitate cognitive processing (e.g., to facilitate lexical retrieval, Krauss, Chen, & Gottesman, 2000, or alleviate cognitive load, Goldin-Meadow, Nusbaum, Kelly, & Wagner, 2001).

We teased apart communicative from cognitive constraints in a study in which speakers told the same Road Runner cartoon story twice to one addressee and once to another addressee, counter-balanced for order (Addressee1/Addressee1/Addressee2 or Addressee1/Addressee2/Addressee1). We examined attenuation across retellings in terms of how narrative content was encoded (the number of events mentioned, the number of words, and the amount of detail used), in terms of spoken articulation, and in terms of the distribution of gesture types and the motoric execution of gestures (their size and iconic precision).

Stories retold to the same (Old) addressees were attenuated compared to those retold to New addressees. This was true for events mentioned, number of words, and the amount of detail encoded. Moreover, lexically identical expressions by the same speaker were less intelligible to another group of listeners when the expressions had been addressed to old addressees than when they had been addressed to new addressees. Similarly, speakers gestured less frequently in stories retold to Old Addressees than New Addressees. Moreover, the gestures they produced in stories retold to Old Addressees were smaller and less precise than those retold to New Addressees, although these were attenuated over time as well.

These findings suggest that given/new attenuation can be observed at various grains of multi-modal behavior, all the way from planning to execution. Adapting speech and gesture for-the-addressee is computationally feasible and can occur readily when the addressees' informational needs can be represented as a simple constraint (e.g., my addressee has heard this before, or not). This adaptation in speech and gesture has implications for understanding the alignment of the two modalities during production, insofar as they are guided similarly by cognitive and communicative constraints. Still, speech and gesture may unfold more independently at some junctures of processing, possibly due to differences in their semiotic properties (e.g., lack of conventions about the motoric execution of gestures).

Keywords: audience design, dialogue, common ground, storytelling, partner, specific adaptation, given, new effects, speech and gesture production



# Teasing apart listener-sensitivity: The role of interaction

Prakaiwan Vajrabhaya, Eric Pederson

University of Oregon – United States

Submitted as a part of the proposed panel *Gesture, gesture: Tracking gestures in repetition*

Perspectives on the function of gestures can be grouped into two main views. The first view, which we term the Listener-neutral explanation, contends that gestures are performed to aid the speaker cognitively in the process of speech production (e.g., Kita, 2000; Krauss, Chen, & Gottesman, 2000). Essentially, typical gesturing is an act that speakers perform to facilitate their own speech production and have no inherent reference to the listener.

The second view, on the other hand, contends that gestures are a listener-sensitive act that is socially-driven and have a tendency to be communicatively-oriented (e.g., Bavelas, Gerwing, Sutton, & Prevost, 2008; Holler & Wilkin, 2009; Kendon, 2004). We propose that listener-sensitivity models should be further divided into two sub-categories. First, gesture production may be influenced by the speakers' assumption of the state of knowledge that the listener holds, which we term the Listener-modeling explanation. As contradictory to the name as it may seem, this explanation essentially appeals to a speaker-internal process; it is not concerned with listener behavior nor the interaction between interlocutors. In contrast, speakers' gesture production may be influenced by an ongoing dynamic interaction with the listener, which we term the Listener-interactive explanation. In this explanation, the rapid exchanges of verbal and non-verbal cues during an interaction give rise to listener-sensitivity, which in turn may influence speakers' gesturing.

A number of researchers have used a repeated gesture paradigm to investigate the role of listener-sensitivity in gesturing. Variation in gesture size, frequency, and, clarity are taken as evidence for listener-sensitivity (Galati & Brennan, 2014; Gerwing & Bavelas, 2004; Jacobs & Garnham's, 2007). These studies allowed, if not encouraged, interaction between interlocutors. In contrast, the present study reduces variation in interaction by using confederate listeners, who the subjects believe to be genuine novel listeners, but who provide minimal verbal and non-verbal feedback. Results show that when speakers can only utilize their assumption of the listener's state of knowledge, without input from an interaction, their motoric commitment to gesture decreases as a simple function of repetition. We thus propose that speakers only modify their gestures (as in the previous studies cited above) as a result of an active interaction (the Listener-interactive explanation). In other words, we reject the likelihood that speakers substantially modify their gestures as a result of modeling the listener's assumed state of knowledge (the Listener-modeling explanation).

Keywords: Repetition, gesture reduction, experimental methodology, common ground





# Using different gesture rate metrics when studying gesture production in repeated references.

Marieke Hoetjes<sup>1,2</sup>, Emiel Krahmer<sup>1</sup>, Marc Swerts<sup>1</sup>

<sup>1</sup> Tilburg University [Tilburg] – Tilburg University PO Box 90153 5000 LE Tilburg The Netherlands, Netherlands <sup>2</sup> Radboud University – P.O. Box 9101 6500 HB Nijmegen The Netherlands, Netherlands

Repeated references are often reduced, both acoustically (Bard, et al., 2000) and lexically (Clark & Wilkes-Gibbs, 1986). Some studies have found that gesture rate in repeated references can also be reduced (Galati & Brennan, 2014; So, Kita, & Goldin-Meadow, 2009), although other studies did not support this finding (de Ruiter, Bangerter, & Dings, 2012), or found an increase in gesture rate (Holler, Tutton, & Wilkin, 2011). These different findings with regard to gesture production may at first sight seem contradictory, but could be caused by differences between studies in experimental setup and gesture rate metrics. Gesture rate metrics generally relate gesture to speech, for example by relating the number of gestures to the number of words. However, one could also relate the number of gestures to the number of semantic attributes in speech. Practically, it takes more time and effort to analyse semantic attributes than to count the number of words. Theoretically, which metric to use may also depend on whether the researcher considers speech and gesture to be related at the word level, or at the semantic level of the speech production model.

In new analyses of data collected by Hoetjes, et al. (2015), and Hoetjes, Krahmer and Swerts (2015), we compared two different gesture rate metrics in contexts in which repeated references were either successful or not. We compared gesture rate across repeated references in number of gestures per 100 words with the number of gestures per semantic attribute. Participants had to repeatedly describe objects to a listener, either because an object happened to reoccur in the course of the experiment (successful communication), or because the listener could not identify the correct object (unsuccessful communication).

When communication was successful, the number of gestures per 100 words stayed the same across repeated references. That is, we found reduction in repeated references to the same extent for the number of words and the number of gestures. For the number of gestures per attribute there was a lower rate in second references than in initial and third references, caused by an increase in number of attributes in second references. When communication was not successful, the number of gestures per 100 words increased in repeated references, due to reduction in number of words, but not in number of gestures. There was also an increase in repeated references in number of gestures per attribute, caused by a reduction in number of attributes, but not in number of gestures.

The results show that it can be informative to study both types of gesture rate, since these suggest that in repeated references, the communicative context may influence not only the relationship between words and semantic attributes, but also between speech and gesture.

Keywords: cospeech gesture, repeated references, gesture rate metrics



# Quick on the draw: Exploring the multimodal body through Signart

Kyra Pollitt<sup>1</sup>, Ella Leith<sup>2</sup>, Julie Chateauvert

<sup>1</sup>Unaffiliated – United Kingdom <sup>2</sup>University of Edinburgh [Edinburg] – South Bridge Edinburgh EH8 9YL, United Kingdom

This symposium examines the multimodality of gesture on, in and through the body. In each case the data will be drawn from Signart – an umbrella term for the creative forms of natural sign languages elsewhere referred to as ‘sign language poetry’ and ‘visual vernacular’. The symposium will open with the showing of Three Queens by Paul Scott, a British Signartist. An exegesis will be provided.

Live dialogue with a practising Signartist will be followed by three papers exploring different aspects of gesture in Signart, with examples drawn from Paul Scott’s Three Queens: personification and performance; gesture as drawing; and a dance-based analysis of the movement of gesture.

Following questions, it is hoped that the symposium will close with a short, live Signart performance.

Paper #1: Dialogue entre théorie et pratique. Éclairage sur les processus de création et la relation entre l’œuvre et sa réception

Presenter: Signartist { either Paul Scott (BSL), or François Brajou or Djenebou Bathily (LSF)}\*

Paper #2: How he queens the Three Queens: the personification of character and concept in Signart

Presenter:

Paper #3:

Presenter:

Ella Leith, doctoral candidate, University of Edinburgh Gesture as drawing: the curious case of image-imagery in (British) Signart

Dr. Kyra Pollitt □ Le poids du mouvement: l’Analyse Fonctionnelle du Corps et du Mouvement Dansé

Paper #4: comme révélateur esthétique dans la création narrative en langues des signes

Presenter: Dr. Julie Chateauvert Symposium facilitator: Signartist {\*as above} or Dominique Boutet

Keywords: multimodality, sign language, Signart, personification, performance, drawing, movement, dance, dialogue



## Dialogue between Theory and Practice: exploring creative process and kinesthetic empathy

Julie Chateauvert<sup>1</sup>, Kyra Politt, Ella Leith<sup>2</sup>

<sup>1</sup>Transferts Critiques et Dynamiques des Savoirs (EA 1569) – Université Paris VIII Vincennes-Saint Denis : EA1569 – 2 rue de la Liberté 93526 Saint-Denis, France <sup>2</sup>University of Edimburg – United Kingdom

This proposal is to be presented as the opening presentation in the symposium Quick on the draw: exploring the multimodal body through Signart. The intention is to root the theoretical considerations of this panel in a shared understanding of the creative process. The opening contribution, therefore, will take the form of an interview with a practicing signartist, with questions addressing three major themes of the symposium: the creative process; the place of signart within the arts; and the relationship between the artist and the audience during live performance. This dialogue will demonstrate the relevance of theoretical issues to real-world artistic practice. We will discuss how, during the creative process, this artist articulates and refines the various modalities of a signart piece. We will also address terminological questions: is 'poetry' a valid name for this art form or does it conceal its visual and gestural aesthetic components? We will also examine how the reception of signart works differs in terms of kinesthetic empathy, and thus whether our understandings of the notion of literature are mobilized by this art form.

We are considering one of three artists to participate with us in this round table. A formal invitation will be made if the symposium is accepted and when the presence of interpreters is confirmed. Thus, we plan to invite either Paul Scott (BSL), Francois Brajou or Djenebou Bathily (LSF). We intend to prepare this panel jointly with the artist in order to produce a rich interview that explores the central issues. The panel will end with the artist briefly performing an original piece.

Keywords: Sign Languages, poetry, creative process, signart



# How he queens the Three Queens: the personification of character and concept in Signart

Ella Leith

University of Edinburgh [Edinburg] – South Bridge Edinburgh EH8 9YL, United Kingdom

In the study of the oral artforms of sign languages, or Signart (Pollitt 2014), we are gradually seeing a movement away from the traditional emphasis on literary features towards recognition of the totality of the performance: where Signart's visually motivated, pantomimic and gestural elements are fundamental to its creativity. In so doing, we move away from the question of 'where, exactly, do we draw the line between what is and is not [sign language]' (Krentz 2001: 320), to embrace the 'particular discursual freedom' exercised by Signart (Pollitt 2014: 120). The centrality of embodiment to sign language is a crucial consideration: while the spoken modality can be recorded in audio and the physical remainder lost (as in recordings of spoken storytelling and song), in signing 'the articulated cannot be separated from the-artist-in-articulation' (Pollitt 2014: 117). This paper focuses on a core aspect of the-artist-in-articulation: the physical depiction of character. Characterisation is the aspect of Signart that is most transparent to non-fluent signers; indeed, the (re)production of observed or imagined behaviours is ubiquitous across cultures. Illustrative parallels can be drawn with the physical depiction of character in other (spoken) oral performance arts which suggest a shared vernacular of multimodal imitation. Yet the grammar of sign languages permits characterisation in Signart to be layered in creative complexity: as well as being a ubiquitous performance trope, characterisation through 'role- shift' is a fundamental syntactic device used throughout signed discourse in all contexts and registers. Its scope demonstrates that 'the boundaries between linguistic and non-linguistic possibilities of ... embodied communication' are frequently breached (Pollitt 2014: 120). Taking Paul Scott's *Three Queens* as a starting point, I describe how the behaviours of another person, animal, object or even abstract concept can be mapped onto the body of the signer to aesthetic and emotive effect, and how, by 'role-shifting' into the first-person (re)creation of action or speech from alternative perspectives, the Signartist's 'gift with language is already a gift of bodily expression and dynamic stage presence' (Rose 2006: 131). I consider how embodiment of different characters not only permits shifts in perspective, but also facilitates shifts in scale: from the single character to the microcosmic depiction of multiple characters; from the individual to the collective; from the specific to the abstracted. At times, the distinctions between Signartist-as-addressor, Signartist-as-narrator and personified character(s) or concept(s) become unstable, allowing the resonances of one to bleed into another and producing performance-texts that are ripe with kinaesthetic eloquence.

Keywords: sign language, Signart, characterisation, performance



## Gesture as drawing: the curious case of image-imagery in (British) Signart

Kyra Pollitt

Unaffiliated – United Kingdom

This paper emerges from research designed to explore the characteristics of creative forms of a natural sign language (i.e. forms known elsewhere as ‘sign language poetry’ and ‘visual vernacular’ but here together termed ‘Signart’). In order to examine contrary claims about the linguistic nature of certain physical movements in samples of Signart, two approaches were adopted.

The first entailed the establishment of a collective of fifteen professional artists working across a range of media. Fourteen of the artists had no previous contact with any sign language, two had had some minimal contact, and one had second language fluency in a natural sign language. Under controlled circumstances, the artists were each asked to respond to a pre-recorded piece of Signart (including Paul Scott’s Three Queens).

Secondly, four practiced Signartists (including Paul Scott) were each interviewed on a one- to- one, semi-structured basis. The interviews were recorded on camera.

The material generated by these methods -some of which will be presented here - suggests reconsideration of some of the movement found in Signart, challenging more traditional schools of sign linguistic thought and opening consideration of gesture as acts of drawing on, with and through the body.

Further, within such a conceptual frame, it is then possible to consider characteristics of the skill of the Signartist’s body in such terms as efficiency of line, stroke, negative space, perspective, framing, and so on.

Keywords: multimodality, sign language, Signart, sign language poetry, drawing, body, line



# The gravity of movement: Functional Analysis of the Body and Aesthetic Dance Movement as a tool for the analysis of creative sign language.

Julie Chateauvert

Transferts Critiques et Dynamiques des Savoirs (EA1569) – Université Paris VIII – Vincennes Saint-Denis : EA1569 – 2 rue de la Liberté Saint-Denis 93526, France

The communication proposed here is rooted in research conducted during my PhD (Chateauvert, 2014). In this context, I refer to a movement analysis method developed by Hubert Godard and Odile Rouquet - the Functional Analysis of the Body and Danced Movement (AFCMD) - to make a comparative study of two versions of a Signart work composed in American Sign Language. The use of this method appears fruitful and successful for several reasons. First, studies of poetry from a linguistics perspective lead us to consider movement mainly in terms of trajectory and pace, and to describe the formal procedures that are traditionally associated with versification. The perspective developed by referring to AFCMD pays special attention to the initiation phase of the gesture and the way movement is organized in its relationship to gravity. It suggests the preliminary phase of gesture, besides being critical for biomechanics, conditions its expressiveness.

Thus, this method permits a deeper comprehension of movement. It teaches us that one not only signs with the distal articulators of arms, hands and face, but also with weight, negotiation of weight and gravity, through pelvis and spine.

AFCMD, by allowing us to comprehend such movement as poetic device, highlights such times instances when the sequence of the narrative is motivated gesturally, when this intent is related to the construction of meaning or imaging. By admitting the possibility of dance, this analysis allows us to describe the aesthetic qualities of the work inherent in the particular way a specific author moves.

Similarly, refining the ability to watch movement, AFCMD makes it possible to begin to answer important questions raised in previous studies of sign language poetry. (Rose, 1992; Sutton-Spence, 2006; Pollitt, 2014): Where does the text ends? Where does the performance begin? What does metric analysis miss? Is a poem separable from its original author and faithfully reproducible by a secondary performer? Does movement, in a signed work, support the formation of the image as Pollitt suggests? Or is it rather the nexus of identity as suggested by Rose, or Sutton-Spence?

This paper will suggest that movement should be considered as a separate component of the multimodal aesthetic works that are termed 'poems' in sign languages, and that the use of AFCMD to analyze Signart offers a potential solution to current theoretical problems. Examples to support this hypothesis will be drawn from an analysis of Three Queens, by Paul Scott. \* Proposition to be considered for the symposium : Quick on the draw: exploring the multimodal body through Signart

Keywords: Sign Language, Movement, AFCMD, signart



# Multimodal Stance-marking in Signed and Spoken Languages

Sally Rice

Department of Linguistics, University of Alberta – 4-60 Assiniboia Hall, University of Alberta Edmonton, Alberta Canada T6G 2E7, Canada

This panel explores the degree to which linguistic phenomena falling under the rubric of stance or stance-taking can be coherently explored across languages (ASL, Libras [Brazilian Sign], Irish Sign, Dutch, English, and German), language modalities (spoken and signed), and individual expressions of (inter)subjective stance-taking in language. Stance concerns the signaling of the epistemic, the attitudinal, and the emotional in language—a semantic overlay that, simply put, cannot be turned off in face-to-face interaction. Thus, stance is a very broad concept that has only recently begun to receive sustained attention in linguistics, especially by corpus linguists (cf. Biber & Finegan 1988, 1989; Precht 2000) and those conducting research from a functional/cognitive/constructional perspective that takes seriously a commitment to look at natural and contextualized language data from an interactional perspective (cf. Verhagen 2005, DuBois 2007, Englebretson 2007). Happily, there is a small literature emerging on the multimodal marking of stance that focuses on the use of gesture and other co-speech behaviours such as shifts in posture, gaze, and facial expression; head tilts, nods, and shakes; as well as mouth and shoulder shrugs that accompany face-to-face interaction (Debras 2013, Oben & Brône 2013, Schoonjans 2014). The papers in this theme panel follow in this vein in that each pursues a particular (type of) stance expression in a language in order to determine the co-speech or co-sign behaviors that reliably accompany it. In addition to demonstrating the conventionalization of particular bodily gestures with particular stance expressions in signed and spoken language, two other overarching themes unite these papers:

(1) The hypothesis that there is a division of labour in the multimodal marking of the propositional (discourse content) and the epistemic (speaker attitude). Such body partitioning has long been studied in both ASL (Liddell 1995, Dudis 2004, Wulf & Dudis 2007) and gesture studies (Sweetser & Sizemore 2008, Priesters 2012, Priesters & Mittelberg 2013). Non-manual gestures involving the upper body are especially implicated in the marking of the intersubjective in language (Kendon 2002, Haddington 2006, Parrill 2010, Stec 2013, Rice & Hinnell 2015). Strategic movement of the eyebrows, mouth, head, and shoulders when signaling point of view unmistakably places them at the locus of stance-marking. Thus, the upper body seems to do the lion's share of stance-taking work in both signed and spoken languages.

(2) Support for a broader view of what it means to be a linguistic construction. The verbal and the kinesic both constitute form-based mechanisms for signaling meaning. Therefore, we strongly advocate for a view of the linguistic construction that includes rather than ignores what the whole body is doing when speakers and signers face off interactively. The phenomena discussed in this theme panel are, we feel, ripe for a constructional interpretation.

Keywords: stance, multimodality, spoken languages, signed languages, co, speech/sign gesture, non, manual gesture





# The Proximity of Grammar to Gesture: Stance-taking in American Sign Language and Irish Sign Language Constructions

Terry Janzen<sup>1</sup>, Barbara Shaffer<sup>2</sup>, Lorraine Leeson<sup>3</sup>

<sup>1</sup>University of Manitoba – Canada <sup>2</sup>University of New Mexico – United States <sup>3</sup>Trinity College Dublin – Ireland

In some of the first work on grammaticalization in American Sign Language (ASL), Author1 (1998, 1999) noted that grammatical topic marking developed along the pathway of questioning facial gesture > yes/no question marker > topic marker, and importantly, that this development did not include a lexical stage. In other words, a grammatical marker evolved from a widely used gesture. Further studies on grammaticalization in signed languages have turned up additional evidence of grammatical forms having gestural sources. Signed language users map conceptualized scenes onto articulatory space-the space within which signing takes place-such that spatial positioning is motivated rather than random. Further, both conceptualization and articulated spatial positioning are embodied in that spatial scenes are viewed from a particular perspective, which also speaks to motivation into their use. As a result, spatial organization contributes to structural and discourse cohesion, and as part of a language system, rightly belongs in the category of grammar.

Beyond the domain of spatial scenes, however, this feature can grammaticalize further as the signer deals with conceptualizations that are more abstract, using spatial organization to represent something that is less physically motivated (i.e., not an actual scene space) and therefore functioning primarily as grammar.

In support of these claims, we analyze several construction types in ASL and ISL. In an analysis of pronoun spaces, for example, the signer can show conceptualized relations between entities through differential pronoun placements-the signer's mental view of such relationships, which may not have much to do with physical location, is illuminated via an embodied view of her articulation space (Author3,1,2 2012). Second, in a comparative framework (Winston 1995), a signer can use complex, viewpointed spatial positioning to show relationships between ideas that are quite abstract (Author1 2015). And third, signers use particular constructions that draw on embodied spatial arrangements to claim evidential support for assertions they make (Author3 2012; Author3,1 (in press)). Each of these cases can be seen as stance-taking in that the signer not only makes these assertions, but frames them within a subjective viewpointed organization. Our final and most critical claim is that this spatial organization is highly gestural in nature, while at the same time falls within the domain of grammar in a signed language. Gestural elements in both spatial organization (pointing to spaces, positioning the hands in spaces, etc.) and stance-taking (gaze, body orientation and positioning, etc.) combine in these constructions, contributing to the coherent structure of signed constructions and to cohesiveness in the discourse structure, thus participating in the domain of grammar. In signed languages, therefore, gesture and grammar appear closely aligned.

Keywords: Stance, taking, signed language, viewpoint



# Multimodal and cross-register profiling of epistemic stance in spoken English: A multifactorial quantitative account

Camille Debras<sup>1</sup>, Karolina Krawczak<sup>2</sup>

<sup>1</sup> Université Paris Ouest Nanterre La Défense – Université Paris Ouest Nanterre La Défense : EA370 – France <sup>2</sup> Faculty of English, Adam Mickiewicz University, Poznan (WA, UAM) – Faculty of English Adam Mickiewicz University al. Niepodległości 4 61-874 Poznań, Poland tel: (+48 61) 829 3506, (+48 61) 829 3521 fax: (+48 61) 852 3103, Poland

**Problematic:** This study is a multifactorial quantitative account of the profiling of epistemic stance markers in spoken English (Kärkkinen 2003, 2006, 2007). The markers under investigation are the assertive uses of five cognition verbs, characterized by different degrees of speaker certainty: I know, I believe, I think, I suppose and I guess. Their usage is examined for verbal and nonverbal contextual characteristics across three registers from less to more prepared discourse: informal conversational discourse, multipartite media debate and public address. The objective is to reveal frequency-based multimodal usage patterns of the five markers across the three registers. Hypotheses: Three hypotheses will be tested quantitatively. Firstly, it is assumed that register effects will be observed, with more dynamic nonverbal expressivity emerging in the less prepared context of use. Secondly, the position of the epistemic marker within the clause is expected to reflect varying degrees of speaker certainty and commitment with regard to the proposition. This, in turn, will exhibit differences in nonverbal expression. Finally, we hypothesize that a correlation will be observed between utterance initial and final-alignment of the markers and turn-taking in terms of gestural contour.

**Data:** The data consist of videotaped semi-guided conversations between native speakers of British English who discuss environmental issues; TV debates on environmental issues broadcast in relation with COP15 (in Copenhagen in 2009) and COP21 (in Paris in December 2015); and TED talks on the theme of the environment extracted from the TED website (www.ted.com). The data amounts to 6 hours in total, 2h for each type of discourse. They are annotated in ELAN for a range of nonverbal usage attributes that are relevant to the description of epistemic stance, i.e.: manual gestures and their main functions (representational, pragmatic, discourse structuring, after Kendon 2004) components of the shrugging posture (Kendon, 2004, Streeck 2009, Author1 submitted) self-adaptors (Ekman & Friesen 1969), which can take on a communicative function indicating uncertainty (Author1 2015), head movements (McClave 2000, Kendon 2002). The discourse topic is controlled for as the data center on environmental discourse.

**Method & results:** The methodology employed is the profile-based or multifactorial usage-feature analysis (Geeraerts et al. 1994; Gries 2003; Gries & Stefanowitsch 2006; Glynn & Fischer 2010; Glynn & Fischer 2014; Author2 2015). This approach assumes that contextualized language use is indicative of language structure, which can be identified through generalization across many usage events. By combining detailed multifactorial annotation of data with exploratory and confirmatory multivariate modeling, this method enables the identification of statistically significant, frequency-based patterns of multimodal language use. We expect to find evidence in our data that will support the three hypotheses put forward above.

**Keywords:** epistemic stance, register variation, multivariate modelling



# Cross-modal correlates of stance in viewpoint constructions: Evidence from speech, gesture, and sign

Sherman Wilcox<sup>1</sup>, Corrine Occhino Kehoe<sup>1</sup>, Laura Hirrel<sup>1</sup>, Elidéa Bernardino<sup>2</sup>

<sup>1</sup>University of New Mexico (UNM) – United States <sup>2</sup>Universidade Federal de Minas Gerais (UFMG) – Brazil

Language is necessarily shaped by the way speakers evaluate, position themselves in relation to, and align with the targeted referents of stance-taking acts (Du Bois, 2007). Research has shown that speakers use diverse strategies to encode different viewpoints in interaction (Berman & Slobin, 2013); however, with some notable exceptions (Dancygier & Sweetser, 2012; Janzen, 2012), few studies have explored the correlates of stance in the visual modality.

We investigate multimodal constructions involving the stance-related phenomenon of dualviewpoint (McNeill, 1992; Parill, 2009). Dual-viewpoint has been restricted to unimodal cases where different manual gestures are simultaneously depicting both character and observer viewpoint. Multiple viewpoints can, however, be simultaneously expressed across modalities in multimodal constructions (Stec & Sweetser, 2013). Rice and Hinnell (2015) argue that the body is partitioned so that different sectors of the body are recruited for different types of communicative content, including stance meanings. Combining these approaches, we look across modalities and languages at constructions involving dual-viewpoint.

We compare reported speech constructions in English and constructed action in ASL and Libras (Brazilian Sign Language). These constructions are functionally comparable, as they are demonstrations that depict rather than describe referents and events (Clark & Gerrig, 1990). We consider reported speech to be a sub-domain of constructed action, as speech is a sub-type of action, and visual gestures often co-occur as part of the depiction. Thus, functionally speaking, constructed action is a larger category of reenactment which includes verbal, manual, and body gestures.

Using data from American English talk shows, we examine gestures that occur as a part of reported speech constructions. We analyze the formal expression of meanings related to viewpoint in both the visual gestures and the spoken language. We specifically look at how stance is expressed in these dual-viewpoint constructions. We then turn compare these English multimodal, dual-viewpoint, stance constructions and constructed action/dialogue in ASL. We hypothesize that the same general cognitive and functional mechanisms that drive the visual expression of stance in multimodal English constructions are recruited in the expression of stance in ASL constructed action and dialogue.

To test this hypothesis, we expand our comparison to include dual-viewpoint stance construction in Libras. We argue that similarities in the expression of dual-viewpoint across the three languages reflect a construal of objective vs. subjective viewpoint (Langacker, 2008). To our knowledge, this is the first attempt at comparing dual-viewpoint constructions across spoken language, gesture, and signed language.

Keywords: sign, gesture, viewpoint, stance



# "On the one hand...": Opposition and optionality in the embodied marking of stance in North American English

Jennifer Hinnell<sup>1</sup>, Sally Rice<sup>2</sup>

<sup>1</sup> Department of Linguistics, University of Alberta – Canada <sup>2</sup> Department of Linguistics, University of Alberta – 4-60 Assiniboia Hall, University of Alberta Edmonton, Alberta Canada T6G 2E7, Canada

Within the multimodal stance literature, there has yet to be an investigation of form conventions in kinesic expressions of OPPOSITION: the valuing of one position against another. In this study, we examine the verbal and embodied means of expressing OPTIONALITY in North American English. We suggest that while there are classic manual gestures associated with contrast (the most iconic expression being the partially filled [on the one hand ... on the other hand...] construction with the two hands of the speaker setting up the two sides of the contrast), OPPOSITION is often co-expressed in the rest of the speaker's "kinesphere" as well. In expressions of contrast that don't directly reference the hands, the kinesic load shifts from the hands to the rest of the body and is usually rendered more subtly. For example, when a speaker utters the expression by contrast, it is frequently accompanied by a head tilt or gaze shift. Like most expressions of stance, CONTRAST is generally conveyed through a broad range of linguistic items distributed along the lexico-grammatical continuum. In English, speakers signaling contrast can deploy the logical operators or and and; concessives such as despite, nevertheless and although; phrasal units such as by contrast, whether (or not), and on the one hand...on the other hand; in addition to smaller constructions such as this vs. that, and either.../or... and neither.../nor... statements. Despite this expressive heterogeneity, at heart the expression of contrast is fairly simple and binary semantically: two options are presented that are being subjectively evaluated by the speaker. This conceptual binariness is paralleled by a binariness in the movement that co-speech bodily articulators can take. The axes of movements (along the vertical, lateral, and sagittal planes) are limited, resulting in predominant expression of contrast through shoulders moving up/down, hands moving in/out, and head tilting or gaze shifting from side-to-side. Even the enumeration of a range of possibilities reflects the binary limitations of the movement of these bodily articulators, with the binary movements simply repeated to reflect multiple options. In this paper, we focus on speakers' attitudes towards objects in the discourse space, especially speakers' subjective take on a pair of items while tracking what their bodies are doing concomitantly. We examine a range of contrast-marking expressions and demonstrate the use of co-speech behaviour that frequently accompany these expressions in a corpus of videotaped interaction from the Distributed Little Red Hen Media Corpus (Steen & Turner 2013) and 3D motion capture data gathered from speakers of North American English. Co-speech behaviour is annotated according to established schemas (Bressem et al. 2013, Hinnell 2014) such as onset asynchrony and axis, direction and path of movement of the articulator (hands, head, shoulders, etc.).

Keywords: stance, gesture, contrast, body partitioning



# Forms and functions of gesture in decontextualized speech

Katharina Rohlfing<sup>1</sup>, Friederike Kern<sup>2</sup>

<sup>1</sup>University of Paderborn – Germany <sup>2</sup>Bielefeld University – Universität Bielefeld Universitätsstraße 25 D-33615 Bielefeld, Germany

In a recent study, Demir and colleagues identified decontextualized speech to children as a strong predictor for later language competencies, particularly for children whose verbal performance seems weak. The authors considered narratives, explanations and talk within pretend play as decontextualized speech in contrast to all other utterances (Rowe, 2012). Other research underscores the role of this type of speech suggesting that it plays an important role in children's educational success (Cummins, 1986). According to Leech and Rowe (2014), decontextualized speech requires a higher level of thinking and analysis on the part of the child in order to process it without drawing on resources from immediate context (DeTemple, 2001). Rowe (2012) revealed that in children, decontextualized speech occurs when they are 30 months old, and Rohlfing (2011) observed a form of decontextualized speech addressing children in already 24 month-olds. However, little is known about children's own decontextualized speech and gestures performed in early productions of it. If – as it is assumed – decontextualized speech poses a higher demand on children's analytical thinking, different types of gestures should be observable than during contextualized speech, during which children can rely on contextual resources in formulating their thoughts, or, alternatively, gestures may be embedded differently into the current talk. Furthermore, Pouw and colleagues (2014) suggest that there is analytical thinking as opposed to spatio-motoric thinking, from which gestures follow. It is the spatio-motoric thinking, which helps utterance production by providing a situative, context-bound informational organization that is not readily accessible to analytic thinking. Thus, decontextualized speech and gestures production in children might provide insights into less context-sensitive informational organization. On this symposium, we would like to discuss (i) the conditions and features of 'decontextualized speech' in order to arrive at better understanding how and why it might provide opportunities for 'analytical thinking', (ii) whether the gestures differ in decontextualized versus contextualized speech, and if so (iii) how decontextualized speech and accompanying gestures can play a role in formulating thoughts about not immediate referents and (iv) how they might reveal analytical thinking. Finally, we will discuss the results with respect to the question of whether and to what degree spatio-motoric thinking may be involved in and bootstrap decontextualized talk.

Keywords: decontextualized speech, children's gestures



# Gestural markers of decontextualized speech in young children

Jean-Marc Colletta

Laboratoire de Linguistique et Didactique des Langues Etrangères et Maternelles (LIDILEM) – Université Grenoble 3 – France

The mastery of decontextualized speech is a major milestone in language acquisition. In order to learn how to read and write, the child must develop the ability to talk of referents and events that are not accessible within the immediate communication setting (Hickmann, 2003; Karmiloff-Smith, 1979). Advanced types of decontextualized language such as the narrative exhibit a textual structure, display specific properties of coherence and cohesion, and require additional cognitive abilities – extended memory, the structuring of linguistic information, the planning of speech, knowledge of monolog genres, ability to read the interlocutor/reader's mind (Fayol, 1997; Halliday & Hasan, 1976; Nippold & Scott, 2010; Tolchinsky, 2004). However in everyday talk, as adults we constantly switch from contextualized speech (CS) to decontextualized speech (DS) and conversely. In a developmental study on spontaneous narratives during interviews (Colletta, 2009), children aged nine years and over were found to be expert at marking the transition between the narrating of events (DS) and the commenting on it (DS). Together with the explicit linguistic marking of CS-DS transition, gestural and bimodal resources – voice, gesture, facial expression, gaze and posture change – were found to actively contribute to the marking of such transition. What about younger children? Evidence for early DS was found in children aged no more than two years (Rohlfing, 2011; Rowe, 2012). Yet at this age strings of DS speech are very short and the child is not able to verbalize the CS-DS transition. As consequence, we hypothesize, first, that switches from CS to DS in young children involve the same kind of gestural means that were found in older children, and second, that new types of gestures (e.g. abstract pointing, framing gestures, beats) emerge when the child starts to show DS in her speech acts repertoire. To test our hypothesis, we have at our disposal two collections of video data. The first one corresponds to 80 play sessions between an adult and children aged 18 to 42 months (Batista, 2012). The second set corresponds to 47 interviews with children aged 22 to 38 months who were proposed a lexicon task including pictures. In both contexts, some children spontaneously referred to absent characters or past events. All data was transcribed and annotated for speech and gesture under ELAN. Next step is to identify all DS sequences in the data and code for them (i.e. type of sequence, length and structure, semiotic resources involved in the marking of DS) in order to provide a detailed account of the behavioral changes that go with CS-DS transitions in young children's speech. We will discuss the contribution of our findings to the study of gesture development and related early cognitive and social-conversational abilities.

Keywords: decontextualized speech, children, acquisition, gesture





# Children's gestures in two decontextualized speech contexts

Katharina Rohlfig<sup>1</sup>, Friederike Kern<sup>2</sup>

<sup>1</sup>University of Paderborn – Germany <sup>2</sup>Bielefeld University – Universität Bielefeld Universitätsstraße 25 D-33615 Bielefeld, Germany

In our study, we investigated 22 4-year-old children's gestures in two contexts: In one context (Explain), children were asked to explain a game just played minutes before to their caregiver with the purpose to play it later on (cf. Kern, 2003). In another context (Retell), children were asked to retell a story about a recently read book to their caregiver, who was not familiar with this story. The second context thus demanded more decontextualized speech in order to construe a coherent story. We expected children's gestures to differ with respect to frequency and form in the two contexts. Our hypothesis was motivated by recent research by Leech and Rowe (2014) suggesting that decontextualized speech requires a higher level of thinking and analysis on the part of the child when processing it without drawing on resources from immediate context. While in the context Explain, children could draw on the recall of spatio-motoric memories about the just previously performed games' actions, in the context Retell, children had to analytically construe a coherent story that had been presented to them mainly verbally from a picture book. Since the context Retell poses a higher demand on children's analytical thinking (Pouw et al., 2014), we expected different frequency and types of gestures than in context Explain.

We conducted a 2 (context: explain vs. retell) x 3 (types: deictic, iconic and conventional) repeated measure analysis on gestural frequency. We obtained a significant main effect of gestural type  $F(2;20) = 13.24$ ,  $p < 0.001$  with iconic gestures ( $M = 3.79$ ) being the most pronounced type in children's nonverbal behavior that significantly differed from deictic ( $M = 0.68$ ) and conventional ( $M = 0.54$ ) gestures. However, we found neither a main effect of context  $p > 0.69$ , nor an interaction effect of context and type  $p > 0.61$ .

In sum, the results demonstrate that while children used gestures in both contexts, frequency did not vary across them. We can conclude that the assumed difference in spatio-motoric vs. analytic thinking, as elicited via the two different contexts, has not effect on the frequency of gestures. Further analyses will reveal whether the contextual differences affect the form of iconic gestures. Alternatively, it is possible that the cognitive demands are similar in the two contexts. In our future work, we will focus on the iconic gestures and investigate their types as well as their relation to speech. Possibly, gestural iconicity is established through different means in the respective contexts (e.g., form- vs. function-related iconicity), and/or they may fulfill different functions, e.g. as lexical substitutes or as illustrators of verbal descriptions.

Keywords: decontextualized speech, children's gestures, context





# Forms and functions of depictive gestures in early childhood interactions: constituting contexts independent from the here and now

Vivien Heller, Katharina Rohlfig

University of Wuppertal (BUW) – Germany

Taking into account that ‘iconic gestures’ in fact encompass a whole range of depictive practices, the present paper investigates forms and functions of depictive practices in early childhood interactions. Drawing on the analysis of embodiment-in-interaction and analyzing verbal and nonverbal resources within sequentially organized activities, we explore (1) what kind of depictive practices are deployed by children and (2) how these practices are used either to communicate about visible aspects of the immediate context or to create communicative contexts transcending the here and now. The longitudinal analysis is based on video-recordings of parent- child (age 12 to 24 months) interactions. Four dyads were video-taped during a picture-book reading activity at home every six weeks. Using the same book across the 12 sessions allowed us to compare conversations about the same pictures longitudinally.

Findings demonstrate that young children already employ diverse depictive practices that also involve different methods of representation. First, they use their hands as hands and employ manual schemes derived from the usual actions of the hands (e.g. ‘stirring’ for representing the activity of stirring or a spoon). In addition to these imitative practices of depiction, children increasingly use their hands creatively when developing new hand shapes that symbolize objects, actions and protagonists. Sequential analysis reveals that imitative practices – coordinated with other semiotic resources – are typically used to establish intersubjectivity with regard to visible aspects of the immediate context (e.g. labeling objects in the picture-book). In contrast, depictive practices involving symbolic methods of representation are employed to extend the visible context of the picture book and/or to constitute contexts independent from the here and now. These practices are typically accompanied by further contextualization cues that instruct the recipient to ‘see’ the hands not as hands but as vehicles for imagining objects and activities that are either absent or fictional. Finally, it will be discussed how particular depictive practices enable children to engage in ‘decontextualized’ and narrative talk.

All in all, our findings demonstrate that depictive practices should not merely be considered as predictors of narrative development. Instead, particular depictive practices provide the very means for constituting narrative contexts. Furthermore, the study provides evidence that the ability to engage in ‘decontextualized’ and narrative talk emerges much earlier than previously thought.

Keywords: depictive practices, language acquisition, narration, contextualization



# Iconicity in Formal Semantics: Signs vs. Gestures

Philippe Schlenker, Carlo Geraci, Valentina Aristodemo, Mirko Santoro, Jeremy Kuhn, Brent Strickland

Institut Jean Nicod – CNRS : UMR8129 – France

While formal semantics traditionally ignored iconic and gestural aspects of meaning, the situation changed dramatically in recent years, both on the gesture side (e.g. Lascarides and Stone 2009, Giorgolo 2010, Ebert and Ebert 2014, Schlenker 2015) and on the sign language side (e.g. Schlenker et al. 2013, Schlenker 2014, to appear, Davidson to appear, Kuhn 2015). Formal approaches have asked three types of questions: (i) How do iconic enrichments interact with logical operators? (ii) Can formal tests be designed to distinguish various types of enrichment, in particular by their interaction with grammatical rules? (iii) How do semantic categories (e.g. telic/atelic, count/mass, plurals) get reflected in iconic enrichments? Following Goldin-Meadow and Brentari's program (to appear), the panel starts from the premise that "sign should not be compared to speech alone, but to speech-plus-gesture", and it will present contributions of semantic studies to these three questions. The discussant is Cornelia Ebert, a noted semanticist who has pioneered work on 'gesture projection' (= interaction between gestures and logical operators).

Talk #1 investigates the interaction of iconic enrichments contributed by signs and gestures with logical operators. It concludes that might have different 'projection' properties: conic enrichments of signs may be at-issue (= assertive), whereas gestural enrichments are typically non-assertive – presuppositional or supplementary (= appositive-like), depending on whether they co-occur with spoken expressions or follow them.

Talk #2 investigates the interaction between logical operators and pluractional iconicity in ASL and LSF. It concludes that repetition-based pluractional markers have characteristic grammatical properties of pluractionals in spoken language, but also display an iconic behavior that interacts with logical operators.

Talk #3 argues that the iconic contribution of a type of absolute adjective in Italian sign language (LIS) should be analyzed as gestures. The key argument comes from ellipsis resolution: while standard lexical material is 'copied' from the antecedent under ellipsis resolution, co-speech gestures can be 'ignored' by it. Crucially, the iconic component of the relevant sign can be ignored just as if it were a co-speech gesture.

Talk #4 revisits 'Wilbur's generalization', according to which the phonology of sign language verbs makes visible their telic vs. atelic status: sharp edges characterize the former but not the latter. Strickland et al. 2015 showed that non-signers can robustly 'guess' the telic vs. atelic status of a sign based on its form alone, which suggests that Wilbur's generalization is 'known' by non-signers. In semantics, the telic/atelic distinction has been taken to instantiate a verbal counterpart of the count/mass distinction. Several new experiments show that non-signers also 'know' a count/mass counterpart of Wilbur's generalization: signs with sharp edges are taken to have a count meaning, signs without sharp edges are taken to have a mass meaning.

Keywords: formal semantics, sign language semantics, formal approaches to iconicity, gesture projection



# Iconic Enrichments: Signs vs. Gestures

Philippe Schlenker

Institut Jean-Nicod – Centre National de la Recherche Scientifique - CNRS – France

Symposium: Iconicity in Formal Semantics: Signs vs. Gestures An expression may be called iconic if there is a structure-preserving map between its form and its denotation. In (1)a, the length of the talk referred to is an increasing function of the length of the vowel. In the ASL example in (1)b, the final degree of growth is an increasing function of the maximal distance between the two hands realizing the verb GROW. Recent work in sign language semantics argues that (i)when iconic phenomena are disregarded, sign and spoken language share the same 'logical spine' (e.g. Schlenker 2011,2013,2014,forthcoming), but (ii)sign language makes use of richer iconic resources, including at its logical core (e.g. Schlenker et al.2013). But as emphasized by Goldin-Meadow and Brentari (to appear), one should not compare sign to speech, but rather to speech-plus-gesture. The key semantic question is whether speech-plus-gesture has comparable expressive resources as sign-with-iconicity. We sharpen the debate by introducing a distinction between two iconic enrichments: in 'autosemantic enrichment', the form of an expression is iconically modulated to affect the meaning of that very expression, as in (1)a- b; in 'allosemantic enrichment', an expression is iconically enriched by an extraneous element, as in (2)(=enrichment of punish by a gesture).

Autosemantic and allosemantic enrichment interact differently with logical operators. The autosemantic enrichments in (1) behave like standard at-issue (=assertive) contributions and can take scope under logical operators – thus (3)a means something like 'If the talk is very long, I'll leave before the end' (with no implication about what would happen if the talk is just somewhat long); similarly, (3)b means that if my group grows a lot, John will lead it. Recent discussions suggest that autosemantic enrichments can also have presuppositional contributions (Schlenker et al.2013).

Allosemantic enrichments are more constrained. In the at-issue control in (4)a, like this assertively modifies the Verb Phrase; what is denied is thus that any of the relevant individuals punished his son by slapping him – hence if any punished his son, it was in some other way. The target in (4)b triggers the opposite inference: for each of the relevant individuals, if he had punished his son, it would have been by slapping him. In this case, the iconic enrichment universally 'projects' beyond the negative expression none. Schlenker 2015a,b argues that this behavior is reminiscent of presuppositions, illustrated with the presupposition triggers his son and regrets in (4)c: these too yield universal inferences under none. More generally, we argue that co-speech gestures start out as a presupposition-like, while post-speech gestures (=gestures that follow the modified expressions) start out as appositive-like – but crucially neither is assertive (see Ebert and Ebert 2014). This might suggest that even with co-speech gestures spoken language cannot match all the expressive resources of sign language.

Keywords: formal semantics, sign language semantics, formal approaches to iconicity, gesture projection



# Scopable iconicity in American and French Sign Language

Jeremy Kuhn, Valentina Aristodemo

Institut Jean-Nicod (IJN) – CNRS : UMR8129, Ecole normale supérieure [ENS] - Paris, Ecole des Hautes Etudes en Sciences Sociales (EHESS) – Pavillon Jardin 29, rue d’Ulm 75005 Paris, France

In American Sign Language (ASL) and French Sign Language (LSF), we report that inflection on verbs simultaneously displays iconic and grammatical properties. In ASL and LSF, verbs may be reduplicated in at least two ways: exact repetition of the verb and alternating two-handed repetition of the verb. Both inflections generate an inference of ‘pluractionality’: namely, that there are many occurrences of the event.

These patterns are shown to display iconic effects, exhibiting properties that Goldin-Meadow and Brentari (to appear) take to be characteristic of gestural content. The patterns are ‘imagistic’: gradient phonetic manipulations of the speed of repetition are semantically interpreted. For example, when repetition of a sign speeds up then slows down, the resulting inference is that the rate of the event sped up then slowed down. Such effects are invariant cross-linguistically, appearing in both LSF and ASL. An example of an iconic inflection of the word GIVE in ASL is provided in (1), with black bars indicating the forward phonetic motion of the sign.

(1) IMAGE: American Sign Language: Iconic acceleration to a plateau

Concurrently, the sign language patterns mirror formal patterns from spoken language: the two forms impose different entailments regarding the distribution of events. Notably, two-handed alternating inflection produces a ‘participant-key’ reading, which requires that different individuals participate in the different sub-events. In LSF, this is manifested by ungrammaticality when a two-handed alternating form appears in a sentence that has no plural licenser. An example is given in (2). These formal patterns exactly mirror the typology of pluractionality spoken languages (for a recent overview, see Cabredo-Hofherr and Laca 2012).

(2) French Sign Language a. \* ONE PERSON FORGET-alt ONE WORD. b. MANY PEOPLE FORGET-alt MANY WORDS. ‘Many people forgot many words’

We show that the iconic meaning of the pluractional marker in ASL and LSF can be interpreted locally or interpreted globally: for example, an accelerating inflection can indicate the rate at which each individual performed an event, or it can indicate the overall rate at which events were performed by members of a plural licenser. Critically, we show that the level at which the iconic condition is evaluated is exactly the structural position at which the grammatical condition is evaluated. We thus argue that both parts are integrated into a single syntactic unit. Local or global interpretation is captured via linguistic scope-taking.

## References

Cabredo Hofherr, P. and Laca, B., editors, Verbal plurality and distributivity. de Gruyter, Berlin, Boston. Goldin-Meadow, Susan and Brentari, Diane: to appear, Gesture, sign and language: The coming of age of sign language and gesture studies. Behavioral and Brain Sciences

Keywords: Sign language, iconicity, semantics



## Absolute adjectives: Signs Vs. Gestures

Valentina Aristodemo, Carlo Geraci, Mirko Santoro

Institut Jean-Nicod (IJN) – CNRS : UMR8129, Ecole normale supérieure [ENS] - Paris, Ecole des Hautes Etudes en Sciences Sociales (EHESS) – Pavillon Jardin 29, rue d’Ulm 75005 Paris, France

The semantics of Sign Language is sensitive to abstract iconic properties of signs (Schlenker 2014, Aristodemo and Geraci 2015, Strickland et al 2015). These are claimed to be analogue to co-speech gestures (Goldin-Meadow and Brentari in press). We compare iconic and non-iconic absolute adjectives in Italian Sign Language (LIS) showing that iconic adjectives presuppose that the maximum degree is reached. We compare these adjectives with co-speech gestures in spoken Italian and show that they provide identical contribution to the meaning of the sentence.

Iconic absolute adjectives in LIS, like FULL, make the maximum degree iconically visible. Differently from their spoken language counterparts and other non-iconic absolute adjectives like RIGHT, these signs don’t allow imprecise readings (cf.(1)). Still, they are gradable because they are possible in less-comparatives.

(1)\*GLASS FULL BUT WATER ADD A-BIT CAN

‘The glass is full but you can still pour a bit more of water’

(2) MIRKO ASSIGNMENT IX-poss RIGHT BUT BETTER CAN

‘Mirko assignment is correct but it could be better’

Under ellipsis, both kinds of adjectives are fine (cf.(3a)-(4a)). When repeated, only non-iconic signs are possible (cf. (3b)-(4b)).

(3)a. GLASS IX-3a FULL IX-3b LESS b. \*GLASS IX-3a FULL ix-3b FULL LESS ‘This glass is less full than that one’ (4)a. MIRKO ASSIGNMENT RIGHT CARLO ASSIGNMENT LESS b. MIRKO ASSIGNMENT RIGHT CARLO ASSIGNMENT RIGHT LESS ‘Carlo’s assignment is less right than Mirko’s assignment’ The same contrast in (1) is observed in spoken Italian with co-speech gestures (cf. (5a) and (5b)):

(5)a.\*Questo bicchiere `e [GESTURE pieno], ma ci si pu`o ancora aggiungere acqua b. Questo bicchiere `e pieno, ma ci si pu`o ancora aggiungere acqua ‘The glass is full but one can still pour a bit more of water’

We explain the contrast in (1)-(2) by arguing that imprecise readings are blocked by the iconic component displayed by full in (1), which forces a maximum degree reading. This contribution is only inferential since the effect disappears under ellipsis (the iconicity of the sign is not visible) (cf. 3a-3b). Co-speech gesture data are similarly analyzed. The gesture introduces a presupposition (that the glass is full at its maximum degree). The presupposition is disregarded under ellipsis (Schlenker 2015).

Iconic absolute adjectives have an inferential component in LIS. These signs provide similar contribution to the meaning of sentences as cases of gestural enrichment in Italian, thus supporting Goldin-Meadow and Brentari (to appear). The main difference is that the iconic component is obligatory in signs, while can be omitted in spoken languages.

Keywords: Sign Language Absolute adjectives gestures iconicity



# Intuitive iconicity for events and objects: Telicity and the count/mass distinction across modalities

Brent Strickland

Institut Jean Nicod/Ecole Normale Supérieure (IJN/ENS) – Ecole Normale Supérieure de Paris – ENS Paris – France

Across languages, verbs can be classified into two categories. Telic verbs (e.g. "decide," "sell") encode a logical endpoint while atelic verbs (e.g. "think," "negotiate") don't, and the denoted event could therefore continue indefinitely. Just as these verbs can be said to denote events that are either bounded or unbounded in time, languages also distinguish between count nouns that refer to objects that are bounded in space (e.g., "coin," "bag") and mass nouns that refer to substances that are not bound in space (e.g., "rain," "fog"). Accordingly, semanticists (e.g., Jackendoff 1991, Bach 1996) have postulated that telic verbs and count nouns share a deep similarity in how they are represented (with each marking boundedness in either time or space) while atelic verbs and mass nouns also share a representational similarity (by not marking boundedness). In the current project I examine this possibility experimentally. The first experiment replicated a finding from Strickland et al. (2015) in which non-signers lacking any prior experience with sign language were shown signs from Italian Sign Language which either contained a gestural boundary (as instantiated by rapid deceleration or contact between hands and the end of the gesture) or did not contain a gestural boundary but did employ repeated motion. After seeing the sign, participants saw two meaning choices, one of which was atelic, one of which was telic (but neither of which was the actual meaning of the sign). Signs containing gestural boundaries were more likely to be associated with telic meanings while signs lacking gestural boundaries (but containing repetition) were more likely to be associated with atelic meanings. The second experiment was identical to the first, but participants saw meanings choices that were either count or mass nouns. Participants more readily associated signs containing a gestural boundary with count meanings while they more readily associated signs lacking such boundaries with mass meanings. A third and fourth experiment replicated these results in the verbal domain. Signs either containing or lacking gestural boundaries were replaced with written non-words with or without the phonological equivalent to gestural boundaries and repetition. Thus the non-words either contained a phonological stop but lacked repetition (e.g. "zod") or lacked a stop but contained repetition (e.g. "zovov"). Just as in the gestural domain, "stop" words like "zod" were more readily associated with telic verbs and count nouns while words lacking a stop but containing repetition were more readily associated with atelic verbs and mass nouns. Together, these results suggest that the telic/atelic distinction and the count/mass distinction share deep similarities in how their typical referents are represented. In both cases, the relevant categories encode boundedness in either time or space, and people readily associate such boundedness/non-boundedness with the bounded/unbounded forms in gestural/phonological symbols.

Keywords: sign language, iconicity, core cognition, sound symbolism





# Embodied actions, multimodality, and environmentally coupled gestures across Japanese conversational genre

Polly Szatrowski

University of Minnesota – United States

This panel investigates how embodied actions, multimodality, and "environmentally coupled gestures" (Goodwin 2007) are used across Japanese conversational genres, including storytelling among friends, institutional storytelling during museum guided tours, and talk about food. Our approach builds on research related to the cooperative, distributed, systematic use of public signs from diverse mutually elaborating semiotic resources (Goodwin 2011, Streeck, Goodwin & LeBaron 2011), environmentally coupled gestures whose understanding requires taking into account the structure in the environment to which they are tied (Goodwin 2007), and emotion as embodied performance (Goodwin, M. & Goodwin, C. 2000). The papers show how embodied actions are orchestrated through multimodal coordination and simultaneity of talk, prosody, facial expressions, gaze, head nods, touch, body posture, gesture (iconics, deictics (McNeill 1992)), environmentally coupled gestures, and objects in the environment.

The first paper investigates how Japanese storytellers and their recipients coordinate talk and multimodal resources to achieve affect and affiliation during storytelling. The story teller may suspend their telling to direct their gaze at a recipient and shift their facial expression in order to indicate affect, affiliation and stance towards important events in the story. Thus, the storyteller uses multimodal resources to model and solicit the relevant verbal and facial response from the recipient, and achieve shared understanding.

The second paper examines Japanese storytelling within guided museum tours in the US. It sheds light on storytelling in an institutional setting whose organization has distinctive goals and situated identities (Zimmerman 1998). Visitors use iconic and deictic gestures, and changes in body posture to display understanding, initiate repair, and identify features of objects related to the guide's story. They also use environmentally coupled gestures (such as touching and handling objects on display) to categorize objects and the people who used these objects.

The third paper investigates how Japanese participants talk about the food they are eating at a Taster Lunch or Japanese restaurant. The analysis shows how participants identify, describe and evaluate the food through embodied performances of sensory experiences related to sight, smell, sound, texture, and taste, that stimulate parallel performances by other participants. Pursuit of response involves upgrades with exaggerated gestures, and demonstrations of the actual process of smelling, tasting, etc. while interacting with objects and food in the environment.

This panel furthers our understanding of how speakers use embodied actions, multimodality and environmentally coupled gestures in a variety of Japanese conversational genres. The analyses contribute to research on the organization of human action, cognition and social life.

## PANEL ORGANIZATION:

Presentation 1: Orchestrating facial expressions, gaze and gesture in Japanese storytelling sequences

Presentation 2: Teller and recipient embodied actions in Japanese storytelling within museum guided tours

Presentation 3: Embodied performances of sensory experiences in Japanese talk about food



# Symposium Szatrowski: Embodied actions, multimodality, and environmentally coupled gestures across Japanese conversational genre

Discussant

Keywords: embodied actions, multimodality, environmentally coupled gestures, storytelling, Japanese conversation, sensory experience, gaze, face, museum tour



# Orchestrating facial expressions, gaze and gesture in Japanese storytelling sequences

Shimako Iwasai

Monash University – Monash University VIC 3800 Australia, Australia

This paper explores how speakers and recipients orchestrate their facial expressions, gaze, and gesture in the production of stories that involve reenactments (i.e. depicting and enacting some event from the past) in Japanese conversations. The study focuses on coordinated facial expressions of both the speaker and recipients before the speaker completes the utterance. Sometimes the speaker suspends the production of talk for a moment in the middle of a telling, turns their gaze towards the recipient, and launches an observable shift in their facial expression. Their facial expressions are recognizable as indicative of affect and affiliation, conveying the speaker's stance. This practice is often found before and after speaker's main perspective of the story, and it serves to solicit a relevant response from the hearers. Following the storyteller's gaze shift and intensification of facial expression, the recipient reciprocates responding to stance displays through their facial expression and/or vocal resources. This paper builds on research on emotion and facial expression as an interactional resource that embodies speaker's stance toward the story (e.g. Goodwin & Goodwin, 2001; Perakyla & Sorjonen, 2012). Perakyla & Ruusuvuori (2006, 2012) and Ruusuvuori & Perakyla (2009) investigated how facial expressions help interactants coordinate their actions and regulate their emotional expressions. Examining assessment activities, they demonstrated how the storyteller's facial expression extends the temporal boundaries of the action in question and makes some aspect of the ongoing action persist after the turn of talk. They highlight roles for face as one subtle device in securing shared understanding, and as a non-vocal means to pursue a relevant response. Expanding the prior research, this study focuses on the coordination and the simultaneity of multimodal resources of all participants by analyzing how participants monitor each other and how they design their actions to be monitored through face, gaze and gesture in the storytelling sequences. The present paper examines the way in which bodily conduct is involved in eliciting as well as producing the appropriate reception of telling, employing the empirical methods of Conversation Analysis and drawing upon studies of the multimodal and embodied nature of the organization of human action in interaction (e.g. Deppermann, 2013; Goodwin, 2013; Goodwin & Goodwin, 2004; Streeck, Goodwin & LeBaron, 2011). I demonstrate that interactions involve a fine-grained coordination of language and visual resources. Specifically, collaborative actions are built by both speaker and recipient(s), coordinating language structure with multimodal resources including gaze, head nods, hand gesture, and facial displays. Results contribute to the developing body of research on the orchestration of different modalities in interaction in the process of constituting coherent and meaningful courses of action.

Keywords: multimodality, storytelling, Japanese conversation, facial expression, gaze, embodied actions



## Teller and recipient embodied actions in Japanese storytelling within museum guided tours

Matthew Burdelski, Chie Fukuda

Osaka University – Japan

This paper investigates how tellers and recipients deploy embodied actions during Japanese storytelling within guided tours at an ethnic history museum and a cultural center located in the United States. An increasing amount of research on storytelling has shown ways in which gestures and other embodied actions such as facial expressions, gaze, and touch are important resources in storytelling as a situated activity. Much of this research has focused on both tellers' and recipients' use of verbal language together with non-verbal resources (e.g., Mandelbaum, 2012; Szatrowski, 2010). However, with a few exceptions, there has been little attention paid to the embodied actions of tellers and recipients in storytelling within institutional interaction (e.g., Drew & Heritage, 1992), which is organized in relation to particular goals, roles or situated identities (Zimmerman, 1998), and turn-taking practices. Here, we examine the hitherto under explored ways in which tellers and recipients use non-verbal practices in storytelling within specific institutional settings and activities within those settings. In particular, by focusing on audio-visually recorded guided tours in a museum and at a cultural center showcasing Japanese American history in the United States, we analyze episodes in which recipients' use non-verbal behavior together with verbalization in performing social actions in displaying their understanding in relation to the current talk and/or objects on display. For instance, at times, visitors use embodied actions such as iconic gestures (McNeill, 1992) during the storytelling, and at other times use deictic gestures and body posture (e.g., leaning forward or looking up) to initiate repair or to visually identify a feature of an object that was provided in the guide's prior talk. We also observe how visitors touch or handle objects on display, such as a pair of Japanese iron sandals used by karate practitioners of Okinawan descent in Hawaii for their training, in categorizing and evaluating objects, and categorizing the people who used those objects. The analysis thus brings together work on environmentally coupled gestures (Goodwin, 2007) and other embodied actions with talk and objects in informing our understanding of storytelling in institutional and educational settings related to the teaching and learning of the ethnic history of particular groups of immigrants.

Keywords: museum guided tours, Japanese, institutional interaction, ethnic history



# Embodied performances of sensory experiences in Japanese talk about food

Polly Szatrowski

University of Minnesota – United States

In this paper I investigate how Japanese participants talk about the food they are eating. In 2013, *wasyoku* ‘traditional Japanese cuisine’ was honored by UNESCO as an Intangible Cultural Heritage. The goal of this paper is to suggest how ways that Japanese people talk about and use their bodies in talk-in-interaction while eating familiar and unfamiliar food can provide a window on their multi-sensory experience of food. Unlike previous studies that focused on the meanings of words for tastes and textures of food out of context (Backhouse 1994, Ohashi 2010), this study concerns how participants talk about food in spontaneous conversational interaction while eating. The data come from 2 audio-visually recorded corpora: a Taster Lunch corpus (13 conversations over a 3-course lunch with 3-4 dishes from Japan, Senegal and the US), and a Restaurant corpus (8 conversations over a 3-course *wasyoku* meal).

I show that the way people use their body and environmentally coupled gestures (Goodwin 2007, 2011) together with talk, prosody, and objects in the food environment can provide insight into how they experience food through their senses. For example, a diner may identify an unfamiliar food/drink by its smell. Subsequently, in pursuit of an agreement or response, the speaker may upgrade her identification with an embodied performance smelling the food/drink and animating her sensory experience using objects and food in the environment as in (1).

(1) 779b *kao, o tikazuketa syunkan ni, nioi o kagu* = ‘(my) face, the instant (I) bring (it) close (to the juice), (I) smell (it)=’ ((Beniko lifts her cup to her nose and smells the juice)) 780b ”*A, kore tte siso no kaori*” ”*Oh, this is the fragrance of shiso*” ”*I tell you, you know.*’ ((Aki and Chikao lift their cups to smell the juice together with Beniko))

In (1), Beniko describes how she smells BAFIRA (Senegalese hibiscus juice) while lifting her cup to her nose and bringing her face close to smell it in 779b. Then she animates the direct quote of her thought in a high soft pitch to show her delight in and certainty about the smell in 780b (”*A, kore tte siso no kaori*” ”*Oh, this is the fragrance of shiso*”). Other diners monitoring her performance partake of the smell in a similar manner, and subsequently agree or disagree with Beniko’s identification. This study contributes to research on contextualized social and cognitive activity, language and food, cross-cultural understanding, and the embodied use of language. It suggests that even sensory information is not lodged solely in the individual, but is sustained through and elaborated by actions of multiple participants together with talk, environmentally coupled gestures, and prosody.

Keywords: food, sensory experience, smell, Japanese conversation, environmentally coupled gestures

Discussant: Hiromichi Hosoma



# Gestures and foreign language teaching

Marion Tellier

Laboratoire Parole et Langage (LPL) – CNRS : UMR7309, Aix Marseille Université – 29 av. R. Schuman - 13621 Aix-en-Provence cedex 1 - France, France

The foreign language (FL) classroom is a very specific place as far as communication is concerned: first, the language used by teachers is both the means of instruction and the focus of instruction (Cicurel, 1985, Gil, 2002); second, there is a strong linguistic asymmetry between partners (Cicurel, 2002) on a proficiency basis (the teacher masters the target language better than the learner). Consequently, to facilitate comprehension in FL and carry out his/her teaching agenda, the teacher displays a whole range of gestures that serve different functions and have specific properties (Lazaraton, 2004 ; Tellier, 2008; Azaoui, 2014 ; Tellier & Cadet, 2014). Teaching gestures appear to be somewhat different from regular co-speech gestures. They are used by a teacher as a scaffolding strategy (Bruner, 1983) to help the learner understand what is being said. Also, teaching gestures appear to be produced more consciously than usual co- speech gestures. Most language teachers are able to describe their teaching gestures, and some even have a complete gestural code that they share with their students (Tellier, 2008). Teaching gestures are thus a real professional technique that can be improved with experience and worked on in teacher training (Cadet & Tellier, 2007). This symposium will focus on the analysis of gestures in FL teaching. Studies presented are based on naturalistic data (classroom interactions) and/or data collected within experimental settings. The presentations will shed light on the specific use of gestures in the FL classroom and how it questions what we know about the different types of gestures in communication. A first talk, " On the relevance of interactive gestural function within instructional contexts " questions the definition of interactive gestures (Bavelas et al. 1995) in the context of the language classroom where the speaker (the teacher) addresses several partners (the learners). A second talk, " Why and how do Silent Way teachers gesture? " investigates the use of gestures when teaching with the Silent way approach in which the teacher should remain silent and thus relies on gestures more than speech to communicate. A third talk, " 'Playing' emblems through drama activities in a second language classroom " sheds light of the use of emblems in the classroom as both a focus of instruction and a medium to learn the language. Last, a fourth talk, " Gesture and speech in pedagogical discourse with a non-native speaker in two settings " examines the link between speech and gesture in pedagogical discourse in terms of synchrony and of semantic links in both a natural setting and a semi-controlled one. We thus propose that language teachers' gestures are specific and bring up new questions on the use of gestures produced with a pedagogical intention. We will discuss this through this thematic panel.

Keywords: teaching gestures, foreign language, classroom interaction



## On the relevance of the interactive gestural function within instructional contexts

Can Denizci <sup>1</sup>, Brahim Azaoui <sup>2</sup>

<sup>1</sup> Université d'Istanbul, Faculté de Pédagogie Hasan Ali Yücel – Turkey <sup>2</sup> Laboratoire Parole et Langage (LPL) – CNRS : UMR7309 – 29 av. R. Schuman - 13621 Aix-en-Provence cedex 1 - France

Theme panel : Gestures and foreign language teaching When Bavelas et al. (1992, 1995) proposed to consider an interactive gesture category, their first argument was that previous gesture research was based on data deriving from monological contexts. Yet, they observed, most common setting for discourse was face-to-face dialogue, which introduces the need for interlocutors to coordinate their dialogue or refer to the addressee. Among the functions interactive gestures may serve, some like requesting someone to talk may overlap pragmatic functions. Consequently, it appears that the frontier of the category raises question all the more so as other researchers either use it to refer only to those gestures that regulate turns (Kendon, 2004), or argue that interactive gestures may rather be grouped under pragmatic gestures (Streeck, 2009). Besides, if Bavelas et al.'s initial argument was coherent with a social approach to conversation, we believe the reflexion may consider an even broader definition of interaction and encompass settings with more than two participants (Goffman, 1981). Instructional contexts are one example. Their polylogal and polyfocal dimension (Azaoui, 2014, 2015; Rivi`ere & Bouchard, 2011) facilitates simultaneous interactions and complexifies teachers' multimodal management of interaction (Azaoui, 2015). Besides, since there is more than one addressee at a time, teachers' gaze becomes a valuable source of information as to the identity of his interlocutor.

Thus, the aim of our study is to determine to what extent Bavelas et al.'s definition of interactive gestures is relevant in instructional contexts. We will answer the following questions: Is the functional category as defined by Bavelas et al. operable for describing gestures in language classroom? If not, which other definition may be more suitable to this specific context and help determine which gestural dimensions can be considered more interactive? What about the role of gaze to define the degree of interaction in terms of gestures?

Our analysis is based upon video corpora of classroom interactions in secondary schools in France and Turkey. Interactions were transcribed and coded in ELAN (Sloetjes & Wittenburg, 2008) and analysed following a qualitative approach. The results show that the gestures that can be considered as interactive are deictics and emblems. Notwithstanding, the question of this function's operability for describing teachers' gestures can be raised. Indeed, it was found that interactive gestures cannot be limited to those addressed to the interlocutor only as it was found that a gesture is sometimes oriented towards a student but the gaze is directed to another/others. Besides, apart from the gestures serving to inform most of the gestures dealing with classroom management or student assessment (Tellier, 2006) are interactive.

Keywords: interactive gestures, instructional context, language teaching





## Why and how do Silent Way teachers gesture?

Chika Ninomiya<sup>1</sup>, Jean-Marc Colletta<sup>2</sup>

<sup>1</sup> Université Stendhal (Grenoble 3) – France <sup>2</sup> Laboratoire de Linguistique et Didactique des Langues Etrangères et Maternelles (LIDILEM) – Université Grenoble 3 – France

Several teaching methods place the use of multimodality at the core of their practice (e.g. Borel-Maisonny's *Méthode gestuelle* for learning how to read and spell words). Despite true success with teachers who teach to students with various disabilities (late language acquisition, SLI children, deaf children, mental handicapped children), such pedagogies remain largely unemployed and received little if no scientific interest – the haptic approach to spelling and reading (Bara, Gentaz & Colé, 2005) put apart. One pedagogical approach to language teaching is of particular interest to people who work on gesture, namely, the 'Silent Way' (SW) method as created by Caleb Gattegno (1976, 1978). Not only does it systematically represent linguistic knowledge in a bimodal way – using visual charts to represent phonemic units as well as oral words and sentences –, it presents itself as a specific way of teaching:

- SW aims at constantly forging awareness of the target language features in the students;
- SW subordinates teaching to learning as the former is based on the level and progression of students, and it requires the active and permanent participation of learners.

As a consequence its most prominent characteristic lies in the teacher's communication behavior. Unlike in common teaching methods, the SW teacher remains silent, is busy eliciting linguistic production from the students, and is constantly scaffolding their productions and addressing feedback to them.

The empirical import of the study we present is to provide description and analysis of the multimodal communication behavior of the SW teacher in the classroom, the part played by gesture resources and their function. On purpose, we collected video data of nine teaching episodes (4.30mn average duration) selected from a set of teaching sessions to adults that involved six SW teachers. Teaching episodes focused on pronunciation, numeration, depiction, and conversation. All participants' visible communication behavior was transcribed and annotated under ELAN for the following variables: speech, gesture (i.e. pointing, representational, pragmatic and beat gestures), type of action (i.e. linguistic production, eliciting, scaffolding, giving feedback on production, managing the lesson) both at the micro speech turn and macro activity levels.

As expected, the SW teacher speaks less and gestures more than the students, whatever the teaching session. The teacher's gesture behavior is to be found in any type of activity including those who strongly rely on speech in common method teaching (i.e. scaffolding the student's linguistic production, guidance, 'on line' assessment and feedback). In our presentation, we will illustrate these findings with examples of the most striking gestured teaching techniques used in SW. We will also question its underlying cognitive foundations within an embodiment and mimism framework (Calbris, 2011; Gibbs, 2006; Jousse, 1974).

Keywords: Teaching, Foreign language, Silent Way, Gesture, Mimism



## "Playing" emblems through drama activities in a second language classroom

Federica Tummillo

Groupe d'Etudes et de Recherches sur la Culture Italienne (GERCI) – Université Stendhal – Grenoble III – France

**Theme panel: Gesture and foreign language teaching** In this contribution we investigate the effects of reproducing emblematic gestures or emblems (Ekman & Friesen, 1969; Kendon 1988; McNeill 1995, 2000, 2005 inter alia) both on memorization of conventional expressions and fluency, as practiced by means of drama activities by second language (L2) learners. We will present, in particular, the results of a study involving ten francophone adult Italian learners (at intermediate-advanced level) participating in a course of 46 hours entitled "Atelier d'italien au travers des pratiques théâtrales" in a private Italian school in France.

The interest of incorporating emblems in a second language classroom has already been established from an intercultural perspective (Calbris & Porcher 1989; Diadori 2002, 2013). From a more pragmatic point of view, emblems are a potential source of misunderstanding for L2 learners since these gestures can have different meanings in different geographical areas and can be produced by native speakers without their spoken equivalent. In Mediterranean countries like Italy, for example, emblems are in fact very numerous and play an important role in everyday communications (see Diadori 1999; Poggi 2006; Caon 2010 for a classification). Thus, the overall understanding of a second language can greatly benefit from the decoding of the emblems of the corresponding culture.

Here we introduce and discuss the hypothesis that emblems can be used in a L2 classroom, not only as intercultural comprehension promoters, but also as embodied conventional expressions that can be reproduced ("played") in drama activities in order to retain their meaning, trigger dialogic interaction between learners, and boost fluency. This hypothesis is based on two main evidences. On one hand, it is known that the reproduction of gestures has a significant positive impact on the memorization of a second language lexicon (in young children at least) (Tellier 2008). On the other hand, several studies have demonstrated the effectiveness of drama-based language teaching for acquiring foreign languages (see Haught & McCafferty 2008 for a review). Thus, our contribution is expected to bring to the scene new elements of discussion on gesture and foreign language teaching and learning.

**Keywords:** Italian emblems, drama based language teaching and learning, second language classroom



# Gesture and speech in pedagogical discourse with a non-native speaker in two settings

Gale Stam<sup>1</sup>, Marion Tellier<sup>2</sup>

<sup>1</sup> Department of psychology, National Louis University – United States <sup>2</sup> Laboratoire Parole et Langage (LPL) – CNRS : UMR7309, Aix Marseille Université – 29 av. R. Schuman - 13621 Aix-en-Provence cedex 1 - France

Gestures occur with elements of high communicative dynamism, new, emphasized, or contrastive information (McNeill, 1992). When interacting with a non-native speaker, native speakers adapt their speech (Ferguson, 1975) and their gestures (Adams, 1998; Tellier & Stam, 2012) to facilitate comprehension. Gestures produced are larger, longer, and more iconic. In the Foreign language (FL) classroom, teachers use gestures to build their discourse and serve several pedagogical functions (Tellier, 2008). However, how gesture and speech are coordinated in speech addressed to non native addressees has not yet been explored. In this paper, we discuss both the semantic links and the synchrony between gesture and speech. Data were collected in two different settings: (1) classroom recordings of French taught to foreigners and (2) a task involving future French teachers explaining words to learners (Tellier & Stam, 2012).

We focus on how teachers explain vocabulary and how they use gestures and speech to build their explanation. Analysis of data shows three main uses of gestures and speech:

First, gestures are used as subtitles of speech. They illustrate what the teacher says. In terms of timing, gestures can be produced in synchrony with speech but they often start before the target word and/or ends after it has been uttered. The use of speech pauses highlight keywords of the discourse and facilitate speech segmentation and comprehension by the learners.

Second, gestures are used to disambiguate speech. In this example, the teacher explains the word "la bavette" which is a piece of beefsteak, but there is an ambiguity as to whether it is a "small piece of beef" or a "small beef" (calf):

Example 1: Teacher's speech : petit bœuf ah c'est petit bœuf [petit morceau de bœuf {1}] ou [petit bœuf

{2}] ? (Small beef ah is it small beef [small piece of beef {1}] or [small beef {2}]?) Teacher's gestures : {1} iconic gesture of both hands showing the shape and size of a beef-steak / {2} iconic gesture with flat left hand at waist level showing the height of a calf

Third, gestures are used to complete speech. In this case they bring different information to the learners. This is often used as a teaching strategy to elicit words from learners and facilitate speech production. In the following example of the same teaching sequence, the teacher asks how to cook beefsteak and expects a specific answer (which is "grilled"): Example 2:

Teacher's speech: [et comment on les cuit (0.66) vous savez le mot {1}]? ([and how do we cook them (0.66) you know the word {1}]?) Teacher's gestures: {1} iconic gesture of the flat right hand moving several times from palm up to palm down like turning a beefsteak on a barbecue

Keywords: teaching gestures, foreign language, synchrony, semantic link

Discussant: Wendy Sandler



# Visual attention to gestures

Amelia Yeo

University of Wisconsin Madison – United States

People gesture when they speak, especially when their speech contains spatial information (McNeill, 1992), or when they are in certain communicative contexts (i.e., instruction). Some studies reported that in conversational contexts, listeners mostly fixated the speaker's face and only rarely attended to the speaker's gesture space (Gullberg & Holmqvist, 1999, 2006; Beattie, Webster & Ross, 2010). Gullberg & Kita (2009) reported that when listeners do fixate on the gesture space, they do so primarily when the speaker's own gaze falls on the gesture, hinting that gesture form provides useful semantic information. Studies using an avatar speaker instead of a human speaker reported that listeners had a much larger proportion of fixations to the avatar's gesture space (Nobe et al., 2000) than prior research with a human speaker. Thus, gestures do appear to capture the listener's overt attention, although the degree to which they do so seems to depend on the conversational context and the identity of the speaker.

The symposium expands upon these findings by presenting papers that highlight the importance of the speaker's gestures to the listener across several different contexts. The paper "Visual attention to gestures in face-to-face interaction – what eye-tracking can and cannot tell us" addresses the implications and limitations of visual attention to gesture. The paper "The effect of gesture redundancy and speech disfluency on listeners' fixation to speakers' gestures" examines how listeners' expectations about gesture causes them to allocate attentional resources differently.

The two subsequent papers highlight the function of a teacher's gestures in helping students learn math by exploring how listeners pay attention to gestures in an instructional setting. In one of the papers entitled, "Gesture guides visual attention during learning: Insights from eye tracking", the authors explore how gesturing during a math lesson for 9-10 year old children guides the children's visual attention more so than a lesson with speech alone and determine what patterns of looking best predict learning. In the paper entitled "The Effect of Gesture on Visual Attention During Math Learning in College Students" the authors explore how gesturing during a math lesson for college students decreases students tendency to look ahead in the problem during instruction, suggesting that one way gesture may facilitate learning is by helping learners overcome their expectations.

In the proposed panel, we demonstrate instances where listeners allocate overt visual attention to a speaker's hand gestures and discuss the implications of these findings. All four papers describe empirical research using eye tracking, and we hope to spark a discussion of the use of eye tracking methods in gesture research. Gestures must be processed by listeners' eyes, so this methodology has the clear potential to inform our understanding.

Keywords: eye tracking, gaze, visual attention, attention, cognitive, communication, psychology, language, instruction, comprehension, learning, interaction



# Visual attention to gestures in face-to-face interaction – what eye-tracking can and cannot tell us

Marianne Gullberg

Lund University [Lund] – Paradisgatan 2 Box 117, SE-221 00 Lund, Sweden

We know that interlocutors attend to and process gestures as well as speech. We know less about how overt visual attention to gestures works in interaction and what it indexes (but see pioneering work by Argyle & Cook, 1976; Fehr & Exline, 1987; Goodwin, 1981; Kendon, 1990; Streeck & Knapp, 1992).

Eye-tracking is a useful tool for studying visual attention and – by extension – cognitive processes underlying behaviour that rely on eye movements and gaze. It therefore holds great promise also to study attention to gestures. Gestures are a potential locus for visual attention as visuospatial phenomena representing movement in the visual field. They may also be the locus of visual attention because they are symbolic movements that encode meaning closely related to but not necessarily identical to that expressed in language and speech. Gestures could thus be visually attended to for low-level perceptual reasons or for reasons related to higher cognitive processes such as information extraction. Finally, gestures are also interactional, social phenomena. As such, their occurrence in situations governed by socially and culturally determined norms for behaviour will modulate visual behaviour towards them. There is thus potential tension between different mechanisms governing visual attention: the tendency to attend to movement, the need to look at what you are seeking information about, and the social conventions that govern gaze in interaction.

In this paper I will problematize these issues and discuss what eye-tracking can and cannot tell us about attention to gestures in face-to-face interaction. I will exemplify three domains: a) the effects of gestural spatial properties on fixations towards gestures in interaction; b) effects of social norms on fixations across live and video-based settings; and c) the relationship between fixation and information uptake in a complex setting where fixation does not always equal uptake, and uptake does not always depend on direct fixation. These examples highlight some challenges involved in using eye-tracking to gauge addressees' attention to gestures. Crucially, just as gestures are multifunctional in interaction, so is gaze. It is a vital component of visual perception and attention, but also a key facet of social aspects of interaction and therefore under the influence of sociopsychological and cultural factors. Eye-tracking data from interaction therefore presents rich and complex problems of interpretation to be handled carefully.

Keywords: gesture, interaction, eye, tracking, gaze



# The effect of gesture redundancy and speech disfluency on listeners' fixation to speakers' gestures

Amelia Yeo

University of Wisconsin Madison – United States

Do listeners attend to speakers' gestures? And under what circumstances do they do so? Current research has not provided an unambiguous answer to the question of when and why listeners fixate speakers' gestures (e.g., Nobe et al., 2000; Gullberg & Holmqvist, 2002; Gullberg & Kita, 2009).

In this research, we examine the effects of co-speech gesture redundancy and speech disfluency on listeners' visual attention to co-speech gestures. Listeners might fixate to a speaker's gesture space when they expect the speaker's gesture is expected to convey important information. Additionally, disfluency in the speech stream could incidentally function as an indicator that the speaker is likely to convey information in the hands. We predicted that listeners would fixate more to the gesture space of the speaker when the speaker's gesture contains essential information absent in speech than when the speaker's gesture is redundant with speech. We further predicted that listeners would fixate more to the speaker's gestures when speech is disfluent than when speech is fluent.

To address these questions, we conducted an experiment with a 2 (Gesture-redundant/Nonredundant) by 2 (disfluent/fluent speech) fully-within subjects design. On each trial, the participant viewed an array of shapes that included either one or two triangles. The participant was then presented with a video of a speaker saying a sentence (e.g., "The triangle changed from orange to grey") while making a hand gesture that portrayed a property of a triangle. For arrays with only one triangle, the speaker's gesture was redundant. For arrays with two triangles, the gesture offered disambiguating information. When the video ended, the participant had to select, from four options, the one that matched the description given by the speaker. Participants' eye gaze was tracked throughout the experiment.

We coded whether each participant fixated on the video speaker's gesture space at least once while the speaker was talking. Listeners fixated to the speaker's gesture space significantly more often in the Gesture-Nonredundant condition than in the Gesture-Redundant condition,  $2(1) = 8.74$ ,  $p < .01$ . Additionally, listeners fixated to the speaker's gesture space significantly more often in the disfluent speech condition than in the fluent speech condition,  $2(1) = 3.03$ ,  $p = .08$ . There was no significant interaction between gesture redundancy and speech disfluency,  $2(1) = 1.76$ ,  $p = .18$ .

Our results support the hypothesis that listeners direct overt attention to a speaker's gestures more often than when the gesture conveys information not present in speech, implying that listeners generate expectations about the perceived importance of the speaker's gestures and direct attention accordingly. These findings also provide tentative support for the hypothesis that speech disfluency makes listeners generate expectations about which modality to attend to for information uptake during communication.

**Keywords:** Eye tracking, co, speech gestures, gaze, nonredundant gestures, expectation, prediction, comprehension, attention, visual, communication, psychology, experimental, empirical





# Gesture guides visual attention during math learning: Insights from eye tracking

Eliza Congdon<sup>1</sup>, Miriam Novack<sup>1</sup>, Elizabeth Wakefield<sup>1</sup>, Steven Franconeri<sup>2</sup>

<sup>1</sup> University of Chicago – Edward H. Levi Hall 5801 South Ellis Avenue Chicago, Illinois 60637, United States <sup>2</sup> Northwestern University – United States

**Background.** Teaching children a new concept with the help of gestures – hand movements that accompany speech – facilitates learning above-and-beyond instruction through speech alone (Singer & Goldin-Meadow, 2005). However, the mechanisms underlying this phenomenon are still being explored. Here, we use eye-tracking technology to explore one mechanism – gesture’s ability to direct visual attention. We hypothesize that gesture may facilitate learning, in part, through its capacity to direct children’s attention to important components of a problem more so than speech instruction alone. To test this idea, we examined how children allocated their visual attention during a mathematical equivalence lesson either with gesture (Speech-Gesture instruction) or without gesture (Speech Alone instruction). **Procedure.** We tested 55 children (31 females, Mage=8.79 years, SDage=0.58,) in a pretest, training, post-test design. At pretest, all children solved 6 mathematical equivalence problems (e.g.,  $3+6+4= \quad +4$ ) incorrectly. During training, children watched a series of 6 short instructional videos on a Tobii 1750 eye tracker in which a woman explained the concept of mathematical equivalence (i.e. making one side of an equation equal to the other side). One group of the children (N=30) saw training videos where the woman produced a complementary “grouping” gesture along with the spoken instruction (Figure 1). The other group (N=25) only saw the spoken instruction. Audio files were identical across conditions. After each of the 6 videos, children solved a problem of their own on a small white board, and received feedback on whether or not their answer was correct. After training, children completed a 6 problem written post-test, comparable in form to the pretest, to assess learning. **Preliminary Results.** The groups showed equal levels of learning during the training (MSpeech- Gesture=4.42 MSpeech-Alone=4.21,  $p=0.74$ ). However, on the immediate posttest, children in the Speech-Gesture condition performed significantly better than those in the Speech-Alone group (MSpeech-Gesture=4.03 MSpeech-Alone=2.92,  $p<.05$ ), suggesting that children who learned from gesture may have gained a more robust or stable knowledge of the concepts taught in training. Preliminary analysis of the eye-tracking data shows that children in the two conditions watched the training videos for different amounts of the total possible viewing time (MSpeech-Gesture=92.2% MSpeech-Alone=89.6%,  $p<.05$ ). However, these looking times did not significantly predict posttest scores ( $p=.83$ ), suggesting that overall visual attention cannot explain the differences in posttest performance. An analysis of children’s allocation of attention across components of the scene demonstrated that children in the gesture condition spent proportionally more of their total looking time attending to the gesture space ( $p<.001$ ) and to the answer of the problem ( $p<.01$ ), whereas children in the speech condition looked more toward the experimenter ( $p<.001$ ). Future analyses will continue to examine more specific patterns of visual attention and statistically model which of these differences in visual attention best account for variations in learning outcomes.

**Keywords:** gesture, eye tracking, learning, mathematics



# The Effect of Gesture on Visual Attention During Math Learning in College Students

Nicole Hendrix<sup>1</sup>, Kimberly Fenn<sup>2</sup>, Susan Cook<sup>1</sup>

<sup>1</sup> University of Iowa – United States <sup>2</sup> Michigan State University – United States

The beneficial effect of gesture on learning has primarily been studied in children. Adults, with fully developed language, might be less likely to benefit from gesture. Indeed, a recent meta-analysis suggests that gesture may offer a greater benefit to younger participants (Hostetter, 2011). We investigated the effect of gesture on math learning in college students, using a paradigm similar to the mathematical equivalence paradigm well-studied in children. We recorded eye gaze to provide insight into the mechanism by which gesture might influence attention and promote learning. We examined learning of an abstract mathematical system (a commutative group of order 3, adapted from Kaminski, et al., 2008). Twenty-five participants were randomly assigned to either a speech alone or a speech and gesture condition. After familiarization to the rules for combining symbols in the novel math system, participants viewed carefully-matched videorecorded lessons explaining how to solve more complex problems. They were then tested on additional problems, and on transfer to a novel system. Participants returned for a second test 24 hours after the initial training. The participants wore a head-mounted eye tracker across both days (Figure 1).

A multilevel logistic regression model was used to examine differences in learning across conditions while accounting for subject and item variability. Preliminary analyses reveal that participants tended to learn more in the gesture condition ( $b_{\text{No Gesture}} = -.58$ ,  $p = .16$ , Figure 2).

Unlike studies using the visual world paradigm (Tanenhaus et al., 1995), and similar to studies of action perception (Flanagan & Johansson, 2003), in both the gesture and no gesture conditions, participants' gaze to symbols typically anticipated reference to the symbols in speech. To assess differential anticipation across conditions, we analyzed the timing of the first look to the right side of the problem during the explanation. All participants looked to the right side of the equation prior to mention in speech (Figure 1). However, we found that participants in the gesture condition shifted their attention to the right side of the problem significantly later than participants in the no gesture condition ( $t(18) = 2.27$ ,  $p = .018$ ). Future work will probe patterns of attention in greater detail, during both the instructional period and the problem solving tests. Visual attention is known to be influenced by endogenous and exogenous factors. Our findings suggest that gesture may be an important tool that can support exogenous control of attention. Listeners seem to be predicting and anticipating where they will need to look, but in doing so, they can lose their coordination with the auditory information. This may be particularly harmful in learning situations where listeners do not have the knowledge they need to make effective predictions. Thus, one way gesture may facilitate learning is by helping learners overcome their expectations.

Keywords: Math learning, Eye tracking, College students





# Talks

# Conductors' style of gaze communication during music performance and rehearsal

Sofia Albanese, Isabella Poggi

Roma Tre University – Via Ostiense 234 - 00146 Roma, Italy

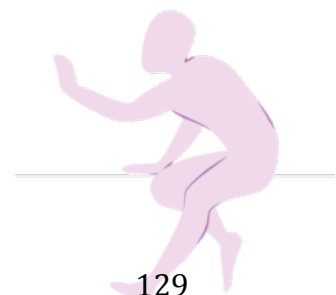
The goal of this work is to apply the results of some research on gaze communication in the domain of orchestra and choir conduction. Research in Sign Language and bodily communication attributed various functions to gaze: syntactic marker (Emmorey, 2005), emotion expression (Ekman, 1979), turn-taking (Goodwin, 1991), backchannel (Jokinen, 2004), but also pointing, iconic communication of physical and mental properties, sentence performatives, metadiscursive functions (Poggi, 2007). This rich repertoire of meanings exploited in everyday communication makes also part of the multimodal code of the Conductor during music performance and rehearsal.

A first step of our research has been to analyze the meanings conveyed by the conductor's gaze in two specific conductors. An observational qualitative analysis was conducted. All items of communicative gaze found in fragments of music conduction were analyzed through an annotation scheme that 1. describes each gaze in terms of its communicative parameters (eye direction, eyebrows movements, eyelids aperture...), 2. attributes it a meaning (e.g., give the attack, blame, express anger, ask for a "piano"), and 3. classifies it as to its musical function (e.g. to provide indication on intensity, rhythm, frequency, expressiveness) and as to the exploited semiotic device (codified, directly iconic, indirectly iconic).

Results showed that the meanings of gaze are shared across Conductors (e.g., both raised eyebrows always convey or accompany a request of singing/playing "piano"; raising only part of an eyebrow indicates higher tunes). The items of gaze that express emotion may be aimed at favoring the performance of singers'/players' technical movement (a frown expressing anger calls for a "forte"), but also at conveying the Conductor's emotion about present performance (ecstatic shut eyes convey enjoyment), inducing in players/singers the emotions to be impressed to music (inner parts of eyebrows raised, displaying sadness, ask for a sad sound). Finally, gaze also conveys mental states (close eyes = concentration) and solicits the technical movement (frown of effort = sforzato; raised eyebrows of circumspection = play softly), while gaze direction requests attention to warn, monitor performance, or give the attack.

After finding the "lexicon" of the Conductors' gaze, the second step was a more extensive observational analysis aimed at comparing the gaze communication of various orchestra conductors, in order to find out differences in their respective style of conduction. The relatively monotonic use of gaze by Toscanini (almost always with his internal eyebrows raised, as in a sad or worried expression) was compared to one of Karajan (who very frequently used to conduct with his eyes shut, but notwithstanding this by his eyebrows could express emotive nuances), and to the very active gaze behavior of Bernstein (using eye closings, frowning and eyebrow raising in a very expressive way).

Keywords: Conductor, gaze, music performance, style



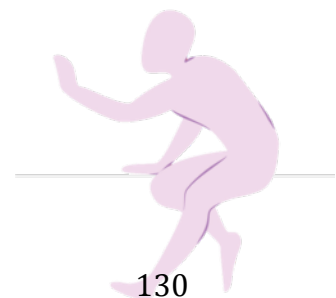
## The mediator gesture in dance improvisation

Graziela Andrade

Universidade Federal de Minas Gerais (UFMG) – Av. Antônio Carlos, 6627 - Pampulha – Belo Horizonte - MG, Brazil

From the point of view of Agamben (1992) we realize that gesture relates to making visible a means as such it, to expose mediality itself, making apparent the "being-in-the-midst-of" which makes men beings of language. We are never something prior to another one in isolation, as it is the mediality that shapes the beings who we are and, similarly, it also conforms what we gesturally are. The mediator character is intrinsic to human movement and that is what the gesture would reveal. It is facing this starting point that we propose a discussion between gesture and dance, which in turn, in the same author's view (Agamben, 2011) would operate between potency and act, that is, it would record an intermediate being between the possibility and the reality which it is a resultant of. For such research, it is necessary to call two other notions of a single author even; the embodiment and the improvisation in dance, by Bernard (2006). The first concerns to a plastic notion of an open body that is, at the same time, sign and reflection of culture, of the imaginary, of our social and political practices in general. The term embodiment realizes an unstable and moving reality; it translates the network image of forces and intensities which we come across and which cross us, continuously. If the embodiment is openness, then sensoriality is the permanent crossing. The embodiment is thus governed by the sensoriality that is, in itself, the crossing. Dance improvisation in turn will relate to alterity and is understood a priori as a founder and primary work of embodiment about itself in its relation to the space-time, vital, material and human environment. That being said we have an idea of gesture, which coincides with mediality itself; of dance, that reveals something about this "be-in-the-middle-of"; of embodiment which passes through and is crossed by the among, and of improvisation, which operates facing difference. Thus, we intend to propose a theoretical reflection that points to the possibilities of thinking and analyzing gesture in danced improvisation as "being-in-the-middle-of unfolds," that is, we suggest that, in this context, dance produces and reveals a gestural orchestration with regards to the ways the subject belongs to and builds his own spatiality and also the ways in which each body arranges and itself, combines and seeks to harmonize the lines of force (Deleuze, 1992) through which it is continuously crossed.

Keywords: Body, Gesture, Dance, Improvisation



# The role of gestures in achieving understanding in Early English teaching in Denmark

Maria Vanessa Aus Der Wieschen, Søren Wind Eskildsen

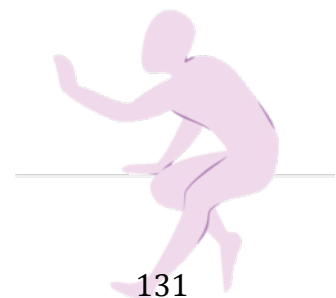
University of Southern Denmark (SDU) – University of Southern Denmark Department of Design and Communication Alsion 2 6400 Sønderborg Denmark, Denmark

A unique characteristic of many foreign language classes, including those in Danish primary schools, is that the foreign language is both content and medium of instruction. That is, students are taught in a language that they are not yet very familiar with. Foreign language teachers can make use of several resources to make their talk more comprehensible, not only obvious ones such as translations to the L1 and providing pictures or realia, but also gestures. This paper investigates gestures employed by the teacher in the pursuit of intersubjectivity in early English teaching in a private primary school in Denmark. The use of multimodal resources employed by teachers in foreign language classrooms has been studied by e.g. Muramoto (1999), Lazaraton (2004), Taleghani-Nikazm (2008), Eskildsen & Wagner (2013), Sert (2015). This research has established gestures as a pervasive phenomenon in language classrooms, used in the service of establishing intersubjectivity, explaining new vocabulary, indexing previous shared experiences, and – in a more principled manner of speaking – how effective use of gestures is a crucial component of a teacher's classroom interactional competence (Walsh 2006).

This paper brings this established agreement on the importance of gestures in classroom interaction to bear on early foreign language learning: Whereas prior work on gestures in L2 classrooms has predominantly dealt with adult L2 learners, this paper investigates the extent to which a teacher makes use of gestures in early child foreign language teaching. Using multimodal conversation analysis of three hours of classroom instruction in a Danish primary school, we uncover how a teacher uses gestures to enhance the comprehension of his L2 talk when teaching English in the 1st and 3rd grade, both of which are beginning levels following a school reform in Denmark in 2014.

In particular, we look at how the teacher combines deictic and iconic gestures with reformulations in the pursuit of the pupils' understanding – and how the children respond. Preliminary analyses indicate that the pupils orient to the teacher's embodied practices in their responses, either in the form of return gestures (de Fornel 1992), recyclings of the teacher's gestures to help other pupils understand the on-going discourse, or displayed task accomplishment. From the ethnomethodological and usage-based stance taken in this paper, these findings have important implications for early foreign language learning and teaching: processes of understanding are socially observable phenomena, made available by the participants through language or other semiotic resources, that must accompany learning. Therefore, the pursuit of pupils' displays of understanding is crucial for usage-based L2 learning to occur. The understanding and participation enabled by the teacher's embodied practices constitute, in this situation, the primordial scene where usage-based L2 learning begins (Eskildsen 2015).

Keywords: classroom interaction, young learners, foreign language learning, conversation analysis





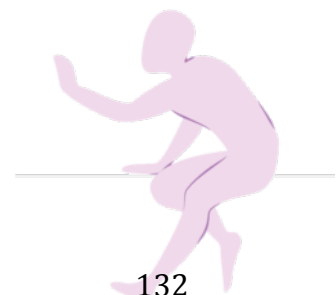
# Getting to the Elephants: Gesture and Preschoolers' Comprehension of Route Direction Information

Elizabeth Austin, Naomi Sweller

Macquarie University (MQ) – Macquarie University NSW, 2109, Australia, Australia

Communication between individuals combines different forms of expression, both verbal and nonverbal, to establish mutual understanding between speakers and listeners (Tversky, 2011). Conveying and understanding spatial task information, such as navigating through environments, is a part of everyday life for both adults and children (Ehrlich, Levine, & Goldin-Meadow, 2006). There is some evidence that both the verbal and nonverbal information produced by speakers is integral to child listeners' comprehension during small scale spatial tasks (Austin & Sweller, 2014). In spatial tasks, such as following novel route directions, listeners do not have the benefit of previous perceptual and motor experiences. Rather, the ability to successfully follow route directions requires listeners to construct a mental representation of space based on a verbal description. Therefore, the aim of the current study is to examine the effects of presenting gesture during encoding on large scale spatial route direction recall. Children (N=173) aged between 3 and 4 years were presented with verbal route directions through a zoo themed spatial array (2.5 meters x 3 meters). Depending on assigned condition, the verbal route directions were accompanied by either no gestures, beat gestures (rhythmic hand movements), or a combination of both iconic (pantomime) and deictic (pointing) gestures. Following presentation of the route directions, children performed two recall tasks: verbal recall, in which each child verbally recalled as much of the route as they could, and "cued" recall, in which children physically walked around the display, following the route directions as closely as possible. Children presented with verbal route directions accompanied by a combination of iconic and deictic gestures recalled more overall than children presented with beat gestures or no gestures accompanying the route directions. This pattern of enhanced recall following the presentation of combined iconic and deictic gestures held for both verbal and cued recall. These findings suggest that the presence of gesture during encoding plays an integral role in effective communication during language development. Not all gestures are equal however, with little beneficial effect seen for beat gestures. This study is an important step in understanding the role our hands play in shaping the way we think about and communicate spatial concepts, particularly in early development.

Keywords: Comprehension, development, cognition, spatial, communication



# Whiteboard, deictics and gaze: prompting as a plurisemiotic action

Brahim Azaoui

Laboratoire Parole et Langage (LPL) – CNRS : UMR7309 – 29 av. R. Schuman – 13621 Aix-en-Provence cedex 1 - France, France

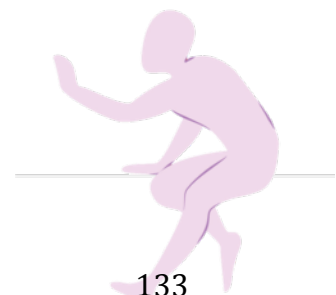
Language teachers resort to a plurality of semiotic supports to make the pedagogical content easier to understand and to have their students gradually become linguistically autonomous. Among the strategies to do so, prompts, which "include a variety of signals, other than alternative reformulations, that push learners to self-repair" (Lyster & Sa'ito, 2010), have certain efficiency (Lyster & Sa'ito, 2010; Ellis, 2005). There are very few studies that analyse the gestural prompting. Muramoto (1998) and Taleghani-Nikazm (2008) showed how gestures participated in the correction process either by indicating the locus of the error or by eliciting grammar self-correction. In this talk, we will discuss the way prompts are performed nonverbally in language teaching classrooms. The corpora under study include two different instructional contexts: teaching French as a second language to non native students and French as a first language to native students. Note that it is rather common in France to have the same educator in charge of these two classes. More than 380 minutes of video corpora were transcribed and coded using ELAN (Sloetjes & Wittenburg, 2008) using McNeill's typology (1992) for coding gestures' dimensions and Tellier's (2006) for coding teaching gesture functions.

Three main questions were answered : 1) What gesture types are recurrently produced during prompts? 2) Who/what does the teacher look at while producing her deictics?

3) To what extent is the prompt production context-sensitive? The findings confirm previous findings by Muramoto, in particular the use of the cup-hand gesture to have students self-correct. Deictics were also regularly used in a metonymic function, ie., while she is pointing at the student the teacher does not refer to the student per se but rather his previous utterance. This gesture strategy allows the construction of joint attention and collective correction. As for the gaze/deictics synchrony, results show the importance of the whiteboard in the prompts performed by the instructors. Indeed, we observed that prompting is a plurisemiotic and multimodal realization as it relies on the interaction of three different semiotic signs - gaze, whiteboard and gestures: the teacher gazes at the students while pointing at the whiteboard. This multidimensional action enables her to use the whiteboard as a "silent scaffolding" (Bouchard, 1998) to lead the students to self-correction. This study deepens our understanding of how this nonverbal prompting is performed and how it serves the teacher's pedagogical intents. Finally, given the specificity of our corpora, the findings show some context-sensitivity in the way plurisemiotic prompts are realized.

---

Keywords: prompt, deictics, gaze, whiteboard, classroom interaction



# Multimodality and Complexity in Children's Negations

Pauline Beaupoil-Hourdel

Langues, Textes, Arts et Cultures du Monde Anglophone (PRISMES) – Université Paris III - Sorbonne nouvelle : EA4398 – UFR du Monde Anglophone, 5 Rue de l'Ecole de Médecine, 75006 Paris, France

Previous research in first language acquisition has shown that negation is a great locus to analyze children's spoken and non-spoken means of expression (Clark, 1970). The present study scrutinizes the interplay between modalities of expression (speech, gestures, vocalizations and body movements) in the construction of negation to account for the complexity of language. This multimodal study brings together functionalist and constructivist theoretical approach (Tomasello, 2003), embodied interaction and gesture studies.

The data is composed of two monolingual French and English children filmed monthly from 10 months to 4 years old in natural mother-child dyadic interactions. A negation was coded when the child or the mother used 1) a spoken negation like no or not in English, non or pas in French, 2) when the speaker used body movements (headshake, pushing objects away) that contributed to express negation and 3) when the interlocutor understood the speaker's behavior as being negative. Using a coding system relying on the use of several compatible programs to combine qualitative and quantitative analyses (Beaupoil-Hourdel et al. 2015), all combinations of spoken and non-spoken negations were coded. Overall, 1172 multimodal negations with 537 occurrences in the English data and 635 in the French data were analyzed.

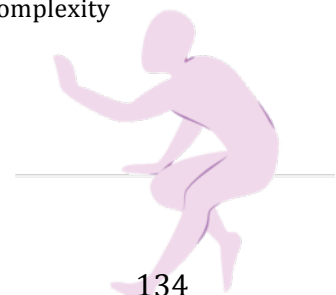
Previous work on the role of gestures in spoken and gestural multimodal utterances have shown that gesture 1) can be equivalent to speech, 2) can complement speech and thus contribute to the construction of meaning in interaction, or 3) can supplement speech by adding a layer of meaning to the spoken utterance (Capirci et al., 1996). This study shows that when children combine modalities to express negation, one can identify several levels of syntactic and cognitive complexity (Sekali, 2012) in the construction of meaning. Cognitive complexity corresponds to the internalized structure of utterances rendered visible by the use of modalities whereas syntactic complexity refers to complex sentences. It is thus necessary to analyze the role of all combinations of modalities of expression in children to understand the complexity of language.

Results show that several levels of cognitive/syntactic complexity are possible:

- 1) the multimodal utterance is neither cognitively nor syntactically complex;
- 2) the multimodal utterance is cognitively but not syntactically complex;
- 3) the multimodal utterance is cognitively and syntactically complex.

Adopting a multimodal approach helps broaden our understanding of complex structure. Indeed, in 3) children produce single-clause utterances and thus simple syntactic sentences. Yet, the association of speech with a non-spoken modality contributes to simultaneously and multimodally express complex sentences with two or more predicates. This study shows that the use of synchronized modalities in negative contexts should be considered a syntactic and cognitive skill. Multimodality therefore implies the re-evaluation of what a complex utterance is.

Keywords: Negation, Cognition, Complexity, Multimodality, Syntactic Complexity, Cognitive Complexity



# Developmental aspects of the use of linguistic and gestural elements in German Sign Language (DGS) in narrative discourse

Claudia Becker, Martje Hansen, Patricia Barbeito Rey

Humboldt-Universität zu Berlin (HU-Berlin) – Unter den Linden 6 D-10099 Berlin, Germany

In face-to-face interactions children and adults combine linguistic devices and gestures to tell a story. Co-verbal gestures can serve – inter alia - textual functions, e.g. highlighting the climax of a narrative. In sign languages, linguistic and gestural devices are combined in a complex way. To mark the high-point, narrators a) emphasise the climax by linguistic and textual devices (e.g. by repeating the related lexemes, use of contrasting lexemes, by describing in detail the climax), b) use a combination of lexical and gestural devices like depicting signs and constructed action (CA) to illustrate the climax, and c) use nonverbal devices pragmatically to assure the attention of the interlocutor (e.g. body/head movements, raised eyebrows, laughing, eye contact).

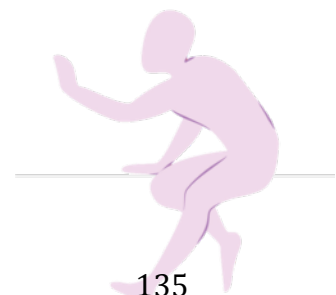
Findings on spoken and signed languages provide evidence, that the ability to produce narratives with complex discourse structures and the use of co-verbal gestures as an additional resource for marking the narrative structure develop with age. Children seem to reach developmental milestones in marking the narrative structure at the age of 6/7, 9/10 and 14 (e.g. Colletta et al 2015, Emmorey & Reilly 1998, Quasthoff & Hausendorf 1996). Therefore, the aim of our study is to find out how deaf children learning DGS as their mother tongue make use of linguistic and gestural devices to mark the climax in narrative discourses across these different age groups.

Method: We elicited authentic stories from deaf children who were 7, 10 and 14 years old (8 children in each age group). All children narrated an event to a deaf interlocutor, which was stage-managed beforehand in always the same manner in the classrooms. The narratives were transcribed and the use of each articulator (hands, body, gaze, mouth, mimic) is analysed in relation to the representation of the narrative climax.

Results: Our findings confirm prior research findings, i.e. the increasing length of narrations corresponds to an increasing number of different linguistic and gestural methods to mark the climax. Furthermore, we find in relation to climax that a) the use of linguistic devices like repetitions increases with age; b) depicting signs and lexemes are modified by body actions to stress and to dramatize the climax in all age groups, but 7-years old show little mimic related to CA. Gaze behaviour in CA changes remarkably with age. c) 7-years use only very few mimic signals like laughing. As for body movements towards the addressee to mark climax, often 10- and 14-years old reduce body movements to head moves, and use more mimic than the youngest group.

Conclusion: With increasing narrative competence, our test persons show an increasingly elaborated combination of linguistic and gestural devices.

Keywords: sign language acquisition, narrative competence, coverbal gesture, climax markers



# The Interaction of Sign Language and Gesture in Theatre Performance

Gal Belsitzman, Wendy Sandler, Atay Citron

The University of Haifa – Israel

Artistic and metalinguistic uses of language, as in poetry and language games, manipulate aspects of linguistic structure for aesthetic effect or entertainment. By extending language beyond its normal boundaries, such manipulations can reveal much about underlying linguistic form and communicative function (Bagemihl 1995, Christen 1998). Similarly, the artistic use of the body by deaf actors in our Sign Language Theatre Laboratory goes well beyond the gestural repertoire that typically accompanies speech or sign to reveal the full gestural potential of the human body.

In this study we show that the accepted categorization of gestures (McNeill 1992) is exploited in a unique way in visual theatre that combines signs with gesture and mime. By artfully blurring the line between language and gesture, theatrical performance by signers casts each into high relief, and reveals an expanded repertoire of visible communicative combinations.

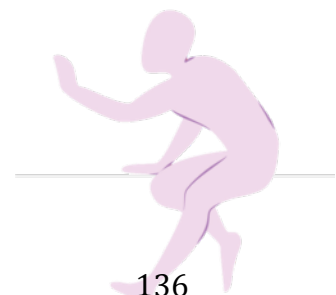
Our videotaped data include an improvised restaurant scene in which the waitress describes the daily specials. In the actress' creative and amusing depiction, we find: (1) the full continuum from language to gesture (McNeill, 1992; Kendon, 2005) – gesticulation, pantomime, emblems, and sign language (e.g., see Figure (1a,b) for a sequence of pantomime and a lexical sign in describing the same event); and (2) use of different parts of the body to produce a range of gestural and linguistic dimensions simultaneously. The result is a medium that merges communicative with corporeal compositionality.

Figure (2) below exemplifies a complex, simultaneous, compositional bodily expression. (a) The actress' right hand is configured to represent a linguistic classifier for a flat object (a steak). (b) Her left hand pantomimes flipping the meat in a pan. (c) On her face is an iconic mouth gesture for a visual 'sound' – the impact each time the meat hits the pan. This is an example of the way in which the roles of mouth and hand in speech are reversed in the iconic gestures accompanying sign language (Sandler 2009). (d) At the same time, the body swings to enhance the effect of the motion conveyed by the hands.

This body movement represents a new non-manual gesture category that arises from our data – Enhancement Body Beats (EBBs) – in which the body mirrors and magnifies the action of the manual gesture. As rhythmic movements aligned with the prosodic patterns of signing, EBBs resemble manual beats (Gullberg 1998), and are another switch in the roles of different parts of the body from those of spoken language. The hands convey the content of the message, and the body conveys the beats.

These and other examples in our analysis of an artistic medium that is exclusively visual go beyond the familiar gestural continuum to manifest a compositional medley of communicative actions.

Keywords: Sign Language/Gesture/Theatre/Multimodality/Compositionality



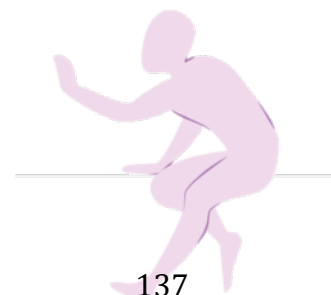
## Gesture on Ancient Maya Artifacts

Anna Bishop, Erica Cartmill

University of California Los Angeles (UCLA) – United States

Gesture is depicted on artifacts from ancient cultures, yet it is surprisingly understudied in archaeology. It is important that archaeologists learn to identify and interpret gesture because it provides a unique window onto the communicative and cultural practices of societies that cannot be studied in vivo. Gesture can also be studied independent of text; this is particularly valuable in artifacts from the New World where imagery is abundant but text is limited. The Maya are an ideal subject for such analyses because of the rich repertoire of posed figures found in ancient Maya art. Researchers have only recently begun to examine the communicative potential of the body in ancient Maya art. Studies have identified and described a few gestures in Maya art that appear in specific contexts (Houston, 2001; Looper, 1983; Miller, 1983). A more holistic study of body forms in Maya court scenes proposed that certain arm positions were used to signal social status of figures in the scene (Ancona-Ha et al., 2000). These studies provide contextual descriptions of gesture on artifacts, but their analytical approaches have more in common with art history than studies of living human gesture. Our work extends archaeological gesture research beyond this art historical approach by introducing coding variables and interactional perspectives from behavioral gesture research. We believe that this methodological cross-fertilization will generate new directions in the study of gesture in ancient societies and open up new times and peoples to contemporary gesture researchers. Here we examine hand gestures on Classic Maya ceramics (200-900 AD), from materials available on the Mayavase Database and at the Popol Vuh Museum in Guatemala. The corpus contains artifacts from multiple geographic regions and includes scenes of elite court life, the supernatural realm, rituals, and myths. We code hand shape, direction, and accommodation for each depicted character, and categorize figures according to their social status, gender, and relation to one another. We compare gesture form to gesturer status, interlocutor status, and the relationship between the two figures. By highlighting the interactive elements of depicted scenes, our analysis bridges traditions from archaeological and behavioral analysis and sheds light on the practices and beliefs surrounding social interaction in Maya civilization.

Keywords: archaeology, art, ancient, status, interaction, Maya, artifact





# Time is on my side (or not): Gesture and spatial metaphors of time in English-speaking studio animation design

Janet Blatter

National Film Board of Canada (NFB) – Canada

This paper highlights speech, gesture, and spatiotemporal conceptualization in time-based visual design, ie., animation planning. While design discourse has been studied (Tversky, 2011), more research is needed to understand gesture in time-based design, and where gestures may include holding tools. We investigate how English-speaking, studio-based animators use speech and gesture during planning. Animation planning requires artists to assume various frames-of-reference (FOR), sometimes taking the temporal and physical FOR of the artist or audience viewing the work real-time on a 2D plane, or from a compressed or expanded timeframe and 360° orientation of a character in the 3D fictive world. (Blatter, 2007). In other words, animators have to shift FOR. Does shifting FOR influence the gestural nature of spatial metaphors of time?

We build on existing research pointing out relationships between conceptualization in speech and concurrent gesture (McNeill, 2005; Kendon, 2004; Goldin-Meadow and Alibali, 2013), language and space (Levinson, 2003), and between FOR and spatial metaphorizations of time (Boroditsky, 2000, 2001; Nuñez, & Cooperrider, 2013). Also relevant to the present study are current cognitive perspectives of spatiotemporal conceptualization and language as being grounded (Barsalou, 2008), embodied (Hostetter, & Alibali, 2008), and situated in environments and cultures (Hutchins, 2005; Nuñez, & Sweetser, 2006).

This study focuses on open-ended interviews with eight Canadian and British English-speaking, studio-based animators described their design process. In all cases, the artists were holding, or looking at, objects. Of 480 minutes of videotaped sessions, 912 sequential speech/gesture utterances referring to space, time, or motion were coded for this study, inc: FOR (allocentric, egocentric, intrinsic), temporal category (deictic, sequence), gestural type (deictic, beat, iconic, metaphoric), and gestural motion (lateral, sagittal, vertical), tool mode (hand-held or display).

Findings revealed that shifting FOR was weakly associated to English as determining gestural motion, or gesturing spatial metaphorizations of time. However, the same gestural motion was 3X more likely to continue regardless of its immediate prior gestural type as beat, iconic, or metaphoric. For example, an iconic gesture for a vertical filmstrip immediately preceded a similar metaphorical gesture for the "length of time". Or, a sagittal, circular metaphoric gesture for "length of time" preceded an iconic gesture for "shearing the sheep".

In all subjects, a physical object grounded the discourse, offering environmental affordances to think about space and spatial metaphorizations of time. This also points to the polysemic nature of certain gestures, suggesting expressions of conceptual blending.

This research concurs with studies indicating environmental affordances, here as hand-held tools or displays. It also suggests a priming effect of gesture in discourse and perhaps conceptualization and simulation. This effect should be further investigated in neuro-linguistic, -cognitive examinations of simulation-as-stimulation, differentiation (Straube, Green, Bromberger, Kircher, 2011), and "reuse" in motor neuron activity (Cánavas & Manzanares, 2014).

Keywords: co, speech gesture, animators, gesture type and sequence, spatial representations of time, FOR, grounded cognition

# Gestural impact of poetic licence: insights from poetry in sign language

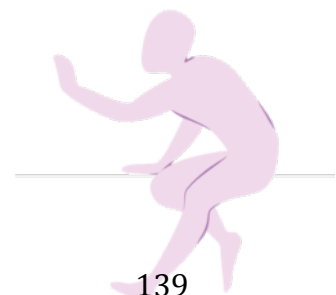
Marion Blondel<sup>1</sup>, Agnès Millet<sup>2</sup>

<sup>1</sup>SFL, CNRS-Paris8 – CNRS : UMR7023, Université Paris VIII Vincennes-Saint Denis – France <sup>2</sup>Linguistique et Didactique des Langues Etrangères et Maternelles (LIDILEM) – Université Stendhal - Grenoble III – UFR des Sciences du Langage - BP 25 - 38040 Grenoble cedex 9, France

In a seminal work, it has been proposed that a manual-visual rather than oral-aural mode predisposes not only the language itself but also its art forms to certain special characteristics [6]. Sign languages are conventional and constrained: physiologically, 'phonologically', grammatically constrained. Crosslinguistic studies of sign languages show that they differ in their core lexicon but tend to rely on common use of spatial references and iconicity, in relation with their gestural ground [5]. Signers and speakers share manual and non manual cues (coverbal gesture) on which gestural languages are built, following systematic rules. These discourse and narrative rules specifically concern manual handshapes, the use of space, body and eyegaze movements [4]. This is true for segmental and suprasegmental parameters [3]. The poetic function figures especially in Poetry where signers can exploit what has been called "internal" and "external" poetic structures [6]. Poetry is also a place where freedom or even transgression from the linguistic rules can be expressed, even if such cases of real transgression are rarely reported in the literature [8].

Our study is based on plurilingual and bimodal data we collected in poetic performances (published like in [1], or unpublished), including crossmodal translations [2], drafts, interviews, and experimental procedures with motion capture. We address three related topics. First, we question the statement that "external poetic structures" (such as creating a balance between the two hands) is "special to sign language poetry" [6] in our corpus of embodied performance of translation of signed poems. Second, we suggest and illustrate that the range of gestural distortions used in poetry and its translation has to do with ambiguity and implicit or unspecified reference rather than real 'rule-breaking' processes. We give examples where the signer is playing with ambiguous spatial references, shifting roles. We also focus on suprasegmental cues and underline the rhythmic and spatial-melodic patterns we found in poems either originally created in LSF or translated from spoken languages. We then pay attention to the way the signer maintains manual handshapes (like alliterations in spoken languages [6]) and strings consecutive signs together. Finally, we explore through metalinguistic and epilinguistic interviews the sociolinguistic reasons why poetic deviation rather than violation is a privileged means of creative signing, either by authors or translators.

Keywords: sign language, poetry



# Gestural alignment in consecutive interpreting?

Franziska Boll

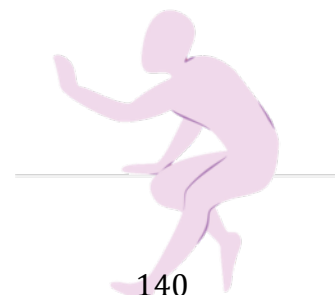
European University Viadrina Frankfurt Oder (EUV) – Große Scharrnstraße 59 15230 Frankfurt (Oder)  
Deutschland, Germany

Interpreting is often described as a verbal translation of speech. However, as Kendon (2004) and McNeill (2005) showed, speaking should be considered as a multimodal process in which gestures play a particular role. Based on these observations, Poyatos (2008) argued that gestures need to be regarded as important as speech in interpreting processes. However, so far gestures are only selectively taken into account, most often in the investigation of simultaneous interpreting (e.g. Rennert 2008, Rodrigues 2007). Here the interpreters tend to sit in sound-proof booths, which means that the audience can not see them gesturing. This paper addresses a different, more interactive form of interpreting: consecutive interpreting, in which the interpreter generally stands next to the speaker. Typically both can see their respective gesturing. The study aims at showing whether in consecutive interpreting both the narrator and the translator align in gesture and speech. Put differently, the question is posed, whether the narrator and the translator influence each other through speech and gestures or whether they adhere to their own kind of gesturing and speech in the interaction. To answer these questions, five storytellings with consecutive interpreting of the children's picture book "Das Zauberei" ("The magic egg") by English and German native speakers have been video recorded (about 50 minutes). Before the recording, participants had some time to make themselves familiar with the story to subsequently tell it to a child-audience from memory. In order to find out if and how the story being told is changed when both the narrator and the interpreter see each other, two experimental conditions were set up. In the first condition the narrator and the interpreter were separated by a curtain. In the second condition the curtain was removed so that they were able to see each other. In both conditions the German narrators started to tell the story; their narratives were interpreted consecutively into English. The video- recorded gestures were examined and described using Bressems notation system (Bressems 2013) in ELAN and analyzed applying a linguistic-semiotic approach (Müller, Bressems, Ladewig 2013; Bressems, Ladewig, Müller 2013) and taking the dynamics of discourse into account (Müller & Ladewig 2013).

The multimodal video analyses revealed that in the first condition the narrator and the speaker used their individual gestures which were interactively negotiated and aligned in the second condition. Although the attentional focus of the narrator and the interpreter was on their audience and on their task to interpret the story, they nevertheless created empirically observable shared meaning in a multimodal communicative manner and therefore the consecutive interpretations became a partly joint storytelling.

As a result, consecutive interpreting should be considered an interactive dynamic process in which meaning is negotiated interactively through both speech and gesture.

Keywords: gestural alignment, consecutive interpreting, dynamic process, meaning making



# Improvisational signing with mouthing: How native signers create temporary expressions in interaction

Mayumi Bono

Mayumi Bono (NII) – 2-1-2 Hitotsubashi, Chiyoda-ku, Tokyo 101-8430, Japan

Everyone has had the experience of not being able to find a word or expression to represent something in his or her mind. In this paper, we investigate how native signers create temporary signing expressions in interaction. Specifically, we illustrate how signers solve this problem by examining their behaviors within the framework of conversation analysis (CA), originally developed for the study of spoken interaction. Typically, if one encounters difficulty in expressing a thought during an ongoing interaction, one tends to temporarily halt the current sequence, move to separate sequence to address the problem, then return to the main sequence once the problem is solved; this type of structured organization is called a "repair sequence." (Schegloff et al., 1977). Previous research pertaining to sign language interaction has not devoted much attention to this kind of sequence organization. However, some researchers have recently begun to focus on issues within the "turn-taking system" (Sacks et al., 1974) of signing, drawing comparisons between signing and spoken interaction (Groeber et al., 2014; de Vos et al., 2015; Girard-Groever et al., 2015).

In our analyses, we focus on several cases involving signers who cannot find an expression or a word to represent a concept. For instance, in one case, when a signer wanted to produce the word for "cartoon," she stopped the current sequence and asked the interlocutors, "How do you express 'cartoon'?" We observe how signers deviated from the ongoing narrative to try to solve this problem interactively, using not only hand signing but also other modalities, such as fingerspelling and mouth movements, referred to as "mouthing" (Braem and Sutton-Spence, 2001). Both of these modalities are derived from spoken language but have not been treated as linguistic elements in previous studies of sign language. A particularly interesting feature of mouthing is that it can be produced in parallel with hand signing. In the example introduced above, the signer added mouthing to improvisational signing to convey the concept of "cartoon." This process is similar to the act of writing ruby characters (e.g., a small furigana above or beside a kanji in Japanese). By relying on mouthing, signers are able to supply a Japanese word in place of the expression or word in sign language that they are unable to retrieve.

Native signers typically live in bilingual environments; in Japan, for instance, signers use written Japanese for reading and writing but Japanese Sign Language for speaking. Furthermore, they have generally had experience with oral training in elementary school, where they learned to produce speech in Japanese. Our study shows how they use peripheral modalities, such as mouthing, in unique ways (e.g., for solving problems in ongoing interaction and initiating repair sequences).

Keywords: Japanese Sign Language, mouthing, improvisational signing, sign language interaction



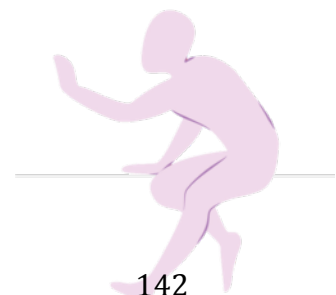
# Aesthetic experience, gestures and language creativity

Nathalie Borgé

Laboratoire de Didactique des langues, des textes et des cultures (DILTEC) – Ministère de l'Enseignement Supérieur et de la Recherche Scientifique – Département de français langue étrangère, Université Sorbonne Nouvelle, 46 rue Saint Jacques, 75005 Paris, France

Works of art, as objects of sharing (Arendt, 1961) with others in a foreign language course, conspicuously trigger not only verbal reactions but also and above all other types of language expressions. Indeed, the social context in which they are likely to be expressed can lead the foreign language learner to resort to gestures rather than words to convey his sensorial, emotional and affective relationship to a photograph or a painting. Besides, for Ludwig Wittgenstein (1966) and for Daniel Arasse (2004), verbal communication is unable to describe the aesthetic reactions that one can feel in front of pieces of art. According to them, aesthetic experience remains intimate and unspeakable. Therefore, the use of gesture can constitute a very efficient means of expression, which is all the more relevant in the case of second language learning as learners often do not master appropriate lexical units to express their aesthetic relationship with accuracy and fluency nor do they feel qualified enough to speak of art in an institutional and academic environment. We will see, on the one hand, how gestures manage to indicate what the verbal language, on account of its limits, cannot translate in front of artistic objects in a social context which can be perceived as intimidating. On the other hand, we will study how they enable the language learner to make up for his linguistic deficit and his lack of confidence. In addition to evoking the compensatory function of gestures, we will also highlight how they can foster intersubjectivity and empathy (Berthoz, 2004) in a multicultural context, thereby improving the processes of language learning and of intercultural awareness. This communication is based on the results obtained in an intervention-action-research led with four university students' groups of advanced French as a foreign language classes at the University Sorbonne Nouvelle-Paris 3 between 2013 and 2015. It emphasizes through the analysis of a few examples to what extent multimodality relying on body language and on gestures is a relevant pedagogical response to overcome the difficulties of translating our affects towards pieces of art and to implement innovative learning tasks in which the learner becomes an aesthetic mediator and develops the other interactants' language creativity.

Keywords: gestures and aesthetic experience, multimodality, innovative learning tasks, mediation



# A show of hands: Plurality as a feature of two-handed forms in silent gesture

Carl Börstell, Ryan Lepic, Gal Belsitzman

Stockholm University (SU) – Sweden

Recent research comparing sign languages (SLs) has shown that meaning influences whether a given sign is one- or two-handed, such that SLs converge on which concepts on a Swadesh list are named with two-handed signs (Lepic et al. 2016). When asked to invent gestures for Swadesh items, hearing American non-signers also preferentially encode certain concepts with two-handed gestures. Interestingly, concepts for which gesturers prefer a two-handed form are usually two-handed in SLs, too (Börstell, Belsitzman & Lepic 2014). Across SLs, one of the semantic features associated with two-handed forms is lexical plurality, where the use of the two hands directly represent quantity by means of "articulatory plurality" (Börstell, Lepic & Belsitzman 2016). Our aim here is to establish whether articulatory plurality is also observed in the silent gestures of hearing non-signers. We compiled a target list of 50 inherently plural concepts from the literature, in three categories: (i) reciprocals (situations involving > 1 participant; 'argue'); (ii) collectives (individuals grouped together; 'team'); (iii) duals (objects consisting of two paired parts; 'scissors'). We matched each item with a random filler item, resulting in a 100-item list. We recruited five hearing Swedish university students (all female, 18–30y/o) who had had no exposure to a SL to view each item (in a fixed, randomized order) as a written Swedish word on a screen and invent a silent gesture for each item. The responses were transcribed for number of hands: 'two hands' (three formational sub-types: same vs. different movements of the hands, and multiple two-handed gestures); and 'not two hands' (three formational sub-types: mixed one- and two-handed, one-handed, and non-manual gesture) (Table 1).

Our target items elicit more two-handed forms than our filler items (Figure 1), with 41/50 target concepts being preferably two-handed, i.e. number of concepts for which more gesturers used a two-handed form than not (Figure 2). Looking at the individual forms produced for all gesturers (i.e. 100 items\*5 gesturers, excluding 'no response'), the fillers are roughly 50:50 in ratio for 'two hands' vs. 'not two hands' (116:111), whereas our target items clearly prefer two-handed forms (160:50), a significant difference according to Yates'  $\chi^2$  test ( $\chi^2=28.441, df=1, p< 0.001$ ). Specifically, target items are associated with two-handed signs with identical rather than different movements of the hands, i.e. the formational type same rather than different (117:24) more so than filler items (73:33), a significant difference ( $\chi^2=6.0157, df=1, p< 0.05^*$ ), arguably reflecting the symmetrical plurality of our target categories.

We argue that articulatory plurality is a feature not only of signed language, but of the visual-gestural modality in general. Thus, we see this as a cognitive phenomenon drawing on universal visual-iconicity principles, rather than a strictly linguistic feature of signed language.

Keywords: silent gesture, sign language, plurality, two, handed, iconicity





# Metaphorical gestures for time in the congenitally blind

Roberto Bottini <sup>1</sup>, Daniel Casasanto <sup>2</sup>, De Fu Yap <sup>2</sup>, Davide Crepaldi <sup>3</sup>, Olivier Collignon <sup>1</sup>

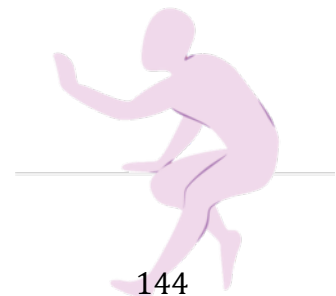
<sup>1</sup> Center for Mind/Brain Sciences (CIMEC) – CIMEC - Centro interdipartimentale Mente/Cervello Palazzo Fedrigotti - corso Bettini 31, I-38068 Rovereto (TN), Italy <sup>2</sup> University of Chicago – Psychology Department, University of Chicago 5848 S. University Avenue, Chicago, IL 60637, United States <sup>3</sup> Scuola Internazionale Superiore di Studi Avanzati / International School for Advanced Studies (SISSA / ISAS) – via Bonomea, 265 - 34136 Trieste - Italy, Italy

Like sighted people, blind people produce spontaneous co-speech gestures. In previous studies even congenitally blind speakers produced deictic and iconic gestures much like their sighted counterparts [1,2]. Yet, blind speakers were not observed to produce any metaphorical gestures, leading researchers to speculate that "although blind individuals may gesture, they may not produce metaphoric gestures" [1]. The authors noted that the tasks they chose elicited few metaphorical gestures from sighted participants, thus the question whether blind speakers typically produce metaphorical gestures has remained open. Here we tested Early Blind (n=15) and Late Blind (n=12) Italian speakers using a task shown previously to elicit spontaneous metaphorical gestures in sighted English speakers [3]. Participants were videotaped while they listened to nine brief stories (50-100 words), one at a time, and then retold the stories from a first-person perspective to a sighted confederate (as in [1,2]) seated in front of them. Participants did not know their gestures were of interest. The four target stories (amid five fillers) each described series of events unfolding in time; two had pastward narrative trajectories and two futureward trajectories. These stories contained no spatial metaphors in language (e.g., a generation before); instead, all temporal ideas were expressed using non-spatial language (e.g., a generation ago).

The speech and gesture were coded separately, following Casasanto and Jasmin [3]. The speech was transcribed and parsed into clauses, and each clause was coded for its temporal content (pastward, futureward, or neither), blind to the accompanying gestures. Gestures were parsed into phrases [4], "deaf" to the accompanying speech, and the dominant direction of each stroke was coded (e.g., up, down, left, right, ahead, back). Like English, spoken Italian contains future-is-ahead / past-is-behind expressions, and although it is absent from speech, both blind and sighted Italians manifest a future-is-right / past-is-left spatial mapping of time in behavioral tasks [5]. All gestures during temporal clauses were coded as Congruent or Incongruent with these space-time mappings.

Results showed a highly significant congruity effect in all of the blind participants, combined ( $p < .00001$ ); participants produced a total of 77 gestures during temporal clauses on either the lateral or sagittal axis, and 75% of these gestures were congruent with the predicted space-time mappings. The congruity effect was significant in both Late Blind ( $p = .0002$ ) and Early Blind ( $p = .048$ ) participants considered separately, and did not differ between groups ( $p = .88$ ). We note that only 26% of participants gestured on the axes of interest during temporal clauses, compared to 61% of sighted English speakers performing the same task [3]. These results provide the first quantitative evidence that even congenitally blind people produce systematic metaphorical gestures, consistent with established space-time mappings in language and mind.

Keywords: metaphor, blind, time



# Typannot: a glyphic system for the transcription of handshapes

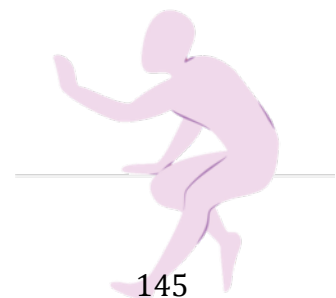
Dominique Boutet <sup>1,2</sup>, Claudia Bianchini <sup>3</sup>, Patrick Doan <sup>4</sup>, Timothée Goguely <sup>4</sup>, Morgane Rébulard <sup>4</sup>, Claire Danet <sup>4</sup>

<sup>1</sup> Université Evry Val d'Essonne (UEVE) – Boulevard François Mitterrand, 91000 Evry, France <sup>2</sup> Centre de Linguistique Anthropologique et Sociolinguistique - Institut Marcel Mauss (LIAS - IMM) – Ecole des Hautes Etudes en Sciences Sociales (EHESS), CNRS : UMR8178 – 54 Boulevard Raspail 75006 Paris, France <sup>3</sup> Formes et Représentations en Linguistique et Littérature (FORELL-EA3816) – Université de Poitiers – Maison des Sciences de l'Homme et la Société 99 avenue du Recteur-Pineau 86000 Poitiers – France <sup>4</sup> Amiens School of Art and Design (ESAD Amiens) – Ministère de la Culture et de la Communication – 40, rue des Teinturiers 80080 Amiens, France

Existing writing systems for Sign Language (SL) (SignWriting [1]; HamNoSys [2]) have seldom taken into account the results of the phonology of SL. Yet, the diversity of phonological approaches and the scope of the results, especially for handshapes, are very rich and may cover many languages [3; 4; 5; 6]. In the context of SL study, three distinct functions can mainly define a writing system: the readability, the writability and the searchability. None of the existing systems offers a good compromise. In this work, we present the construction of a graphematic system able to cover all SL handshapes existing in the world, consisting of features based on a phonological description [6]. This multidisciplinary project, summoning linguists and type designers, aims at producing a readable and stable, unambiguous and fully searchable glyphic system that provides a relevant solution for the transcription of SL and for a forthcoming writing. The graphematic and the glyphic systems (237 glyphs) are modular and adaptable to new configurations as needed, potentially including all the 120 SLs found in the world. The conception of the glyphs was equally guided by the highlighted phonological/phonetical features (graphematic system) and the graphical and scriptural rules (glyph formula) [7; 8]. We consider that the phonetics for handshapes is praxis: beside a linguistic use, phonetic doesn't exist for signs independently from manual activities. The influence of the gestural praxis on the symbolic gestures is investigated here (connection between phonology and phonetics). What roles do the handshapes of prehension play [9] on SL handshapes [10]? The distribution of the selection of the fingers, the independence of each finger, and the behavior of each phalanx have been studied. The results challenge the ideas developed by [5] in favour of Napier's hypothesis of power and precise grips. This analysis suggests an influence of phonetics on the phonology of the handshapes. These features helped designing the shapes and the graphematic system we use and on which we build the glyph formula.

Following this work, and according to the phonological graphematic description of handshapes by [6], a modular graphic system based on phonological key components was devised. This approach allowed an economical and visual, yet rigorous, design process. These glyphs have been tested during a protocol leading to a recognition task (52 subjects) and a compositional task (6 subjects). The results underlined the need to follow logical construction rules using limited numbers of compounds (Version 2), as opposed to more customized shapes for each configuration (Version 1). After this first phase we are organizing and encoding the glyphs in order for them to be fully searchable through the Unicode standard.

Keywords: Sign Language, transcription, Handshapes, glyphic system, Unicode



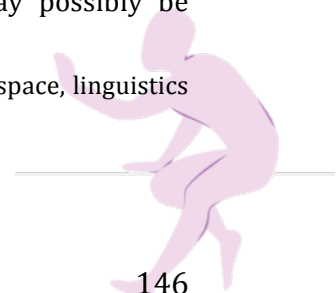
# 3D heat maps of multimodal travel planning: Correlating prepositional and adverbial phrases with locating and routing gestures

Bela Brenger<sup>1</sup>, Daniel Schüller<sup>1</sup>, Matthias Priesters<sup>2</sup>, Irene Mittelberg<sup>1</sup>

<sup>1</sup> Rheinische-Westfälische Technische Hochschule (RWTH) – RWTH Aachen Theaterplatz 4 52056 Aachen, Germany <sup>2</sup> Bielefeld University (CITEC) – Universität Bielefeld Universitätsstraße 25 D-33615 Bielefeld, Germany

How do interlocutors utilize their gesture spaces for spatial-geographical orientation during collaborative travel planning? Indicating potential destinations and routes typically involves the use of highly context-dependent indexical expressions such as certain closed-class items (Talmy 2000) or shifters (Jakobson 1971; Author 4 et al. 2014). Our assumption is that, in spoken German discourse, the use of place names and deictic expressions – such as prepositions (e.g., ‘nach’ (to), ‘von’ (from), ‘bei’ (at)) and locative or directional adverbials (e.g., ‘da’ (there), ‘hier’ (here), ‘r’uber’ (over)) – correlates with distinct kinds of gestural shifts along the main axes (vertical, transversal, sagittal), which consist of locating and routing gestures. Specifically, this study’s target structures are prepositional phrases such as PREP + ADV (e.g., ‘nach hier’, ‘nach da’ (to here/there)) and PREP+N (‘von Norden’ (from north), ‘nach Paris’ (to Paris)) and adverbial phrases comprising ADVlocative+ADVdirectional (e.g., ‘da r’uber’ (over there), ‘hier hin’ (to here)). Regarding spatial orientation and gestural charting, we observed two main strategies: a) indicating places (cities, countries) through locating gestures; and b) tracing trajectories through routing gestures. We hypothesize that whereas prepositional phrases entailing place names or locative adverbs correlate with indexical locating gestures, deictic adverbial phrases may co-occur with both locating gestures and routing gestures containing specific directional movement information that is not necessarily specified in the concurrent speech (Clark 2003; Cooperrider & Nuñez 2009; Coventry et al. 2009; Haviland 2000; Fricke 2007). Drawing on the Multimodal Speech & Kinetic Action Corpus (MuSKA), our approach combines qualitative and quantitative methods to analyze three time-aligned data streams: audio, video and motion- capture data. The sub-corpus used contains 60 minutes of annotated naturalistic discourse data. The speech transcripts were coded for shifters and the adverbial and prepositional phrases in which they occur; the video data were coded for gestural shifts exhibiting locating or routing functions. In three dialogues (42 minutes in total), we identified 300 gesture-accompanied occurrences of locative prepositions and adverbials (130 place names; 170 PREP + ADVlocative or ADVdirectional). Integrating the different data streams and annotated transcripts into a multimodal database allowed us to correlate the gestures’ spatial characteristics with co-occurring linguistic structures. In this mapping process, special attention was paid to the gestures’ spatial attributes, such as the primarily activated axis, movement extension, and location in the emergent and adaptive 3D gesture spaces (Author 3 & Author 4 2013). Normalizing the motion- capture data and scaling the individual gesture spaces facilitated analyses across speakers and dialogues. By aggregating the spatial parameters into overlays and heat maps, we visualized clusters of multiple gesture instances with respect to the targeted linguistic structures. We suggest that the observed patterns of correlated verbal shifters and gestural shifts may possibly be considered instances of multimodal constructions (Goldberg 2006).

Keywords: Motion, capture, heat map, quantitative/qualitative, combined methods, gesture space, linguistics structures



# Recurrent gestures in Savosavo – the case of sweeping and holding away

Jana Bressemer<sup>1</sup>, Nicole Stein<sup>2</sup>, Claudia Wegener<sup>3</sup>

<sup>1</sup> Chemnitz University of Technology – Germany <sup>2</sup> European University Viadrina – Germany <sup>3</sup> Bielefeld University – Universitätsstraße 25 D-33615 Bielefeld, Germany

In recent years, gesture research has seen a growing interest in the study of gestures that show a stable form-meaning relation, are partly conventionalized and culturally shared and often fulfill pragmatic functions. Particular emphasis has been put on a group of gestures expressing refusal and negation in languages such as English, French or German (Kendon 2004, Harrison 2009, Calbris 2011, Author1 and Müller 2014) for which studies identified similar forms and pragmatic functions across languages: They function as speech-performatives (Teßendorf 2014) when rejecting, negating or evaluating topics of talk, and they fulfill performative function when appeasing or stopping the other. However, studies investigating these gestures in lesser-known languages are missing. The talk presents a first analysis of gestures used for the expression of refusal, rejection, exclusion and negation in Savosavo, a Papuan language spoken in the Solomon Islands in the Southwest Pacific (Author2 2012). By concentrating on two recurrent gestures (sweeping and holding away), the talk presents their main forms and functions and reveals similarities to their use in Indo-European languages.

The analysis is based on a subcorpus of 6 hours of video recordings chosen from a corpus of 68 hours, consisting of mostly narratives, some procedural texts as well as a few interviews. The subcorpus comprises monologic, dyadic as well as group constellations of altogether 14 male speakers ranging in age from 39 to about 80. It was collected during the Savosavo Documentation Project (Author2 2012). Altogether, 56 instances of the sweeping away and 56 instances of the holding away gesture were identified. The gestures were analyzed using a form-based linguistic perspective on the study of gestures (Author1 and Müller 2014). Findings show that sweeping and holding away gestures have particular formational and semantic cores that go along with specific referential and pragmatic meanings. Sweeping away gestures may, for instance, enact the completion of a series of events and the exclusion or negation of events. Holding away gestures may, for instance, enact the stopping of events or actions of others, appease or stop the other or take over discursive functions. Moreover, a systematic correlation of form and context for particular formational variants of the holding away gestures could be identified. Furthermore, our analysis revealed a gestural blend, a complex gesture derived by combining the formational and semantic features of the sweeping and holding away gestures.

With these results, the talk contributes to a better understanding of the conventional nature and cross-linguistic distribution of recurrent gestures. Moreover, it is the first study examining recurrent gestures in a small, little known and endangered language. Thus, the paper also presents a particular approach to the analysis of multimodality in the field of language documentation.

Keywords: multimodality, pragmatic gestures, negation, conventionalization, Savosavo



# The Skillful Communicator: The role of gesture in performance and linguistic innovation

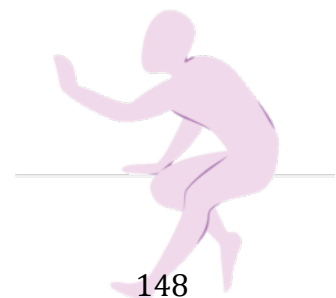
Heather Brookes

University of Cape Town (UCT) – Private Bag X3, Rondebosch, 7701, Cape Town, Western Cape, South Africa

In every day talk, there are moments when speakers ‘break through’ into performance (Hymes 1981). In these performative moments, speakers mark and reframe language as performed by using features of communication in such a way as to draw attention to these features (Coupland 2007). Using video recordings of spontaneous interactions, this presentation examines the role gesture plays in performative moments among male township youth in South Africa. These performances are creative and competitive displays of multimodal linguistic skill when youth gather in groups on street corners to entertain and negotiate status and social position. Analysis of the functions of gesture shows that speakers resemantize words and create new meanings in speech using visual depictions in the gestural mode. They distribute the semantic load between gesture and speech in original ways that are surprising, amusing and aesthetically pleasing. The semantic co-ordination of gesture and speech also tests the audience’s skill in catching the multiple meanings conveyed through different modalities. Skilled speakers time gestures and speech for rhetorical impact creating surprise and humour. They control the inter- actional space with movement, gaze, gestures and pauses to create anticipation to hold audience attention and control participation. The co-ordination of gesture phases with intonation, pauses and the rhythm of speech, the prosodic aspect, makes talk exciting and euphonic as young men describe it. In every street corner group, there is one member who is the most skilled with gesture and speech. His group recognizes his skill as the entertainer and the source of new material whether he adapts new innovations from other groups or creates them. The person with the most linguistic skill is always the leader of the group. The rest of the group adopts his style of speaking and manner of gesturing. Whether the group leader’s innovations spread beyond his street corner group depends on: (1) the level of his linguistic skill in relation to other street corner leaders; (2) his local status based on the extent to which he embodies the characteristics of the ideal township male; and (3) his social power within male networks. In everyday performances, speakers build on existing linguistic and social meanings and generate novel ones. These performances are both linguistically stylized and creative, and a mechanism by which linguistic innovations occur and spread. Based on this analysis of male township performative interactions, I argue that gesture is a crucial part of linguistic skill and performance and a key device in the creation of linguistic meanings, social meanings and linguistic innovation and spread.

Coupland, Nikolas. 2007. *Style: Language Variation and Identity*. Cambridge, U.K.: Cambridge University Press. Hymes, Dell. 1981. ‘In vain I tried to tell you’: *Essays in Native American Ethnopoetics*. Philadelphia, Pennsylvania: University of Pennsylvania Press.

Keywords: performance, innovation, multi modality, linguistic skill, sociolinguistics



# Predictors of Gesture Viewpoint

Amanda Brown

Syracuse University (Linguistics) – HBC 340, Syracuse University, Syracuse NY 13244, United States

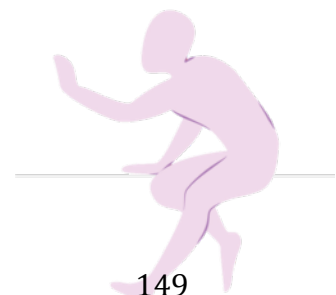
Gestures can be deployed with Character Viewpoint (C-VPT), where an event is depicted as experienced, or Observer Viewpoint (O-VPT), where the event is depicted as observed (McNeill, 1992). Factors previously associated with viewpoint distribution within English include verb transitivity, event centrality, communicative context, discourse status and lexical form of referents, and utterance complexity (e.g. Beattie & Shovelton, 2002; Debreslioska et al. 2013; McNeill, 1992; Parrill 2010, 2012), but differences in viewpoint preference have also been described across languages (e.g. Brown, 2008; Casey & Emmorey, 2009; Kita & Ozyurek, 2003). The wide range of individual predictor variables previously reported suggests that viewpoint selection results from an underlying combination of factors. This study examines the contribution of previously reported and new variables in gesture viewpoint selection.

A corpus of 288 referential gestures from 47 speakers depicting motion and produced in elicited narrative descriptions of the Sylvester and Tweety cartoon, Canary Row, were examined. Using gesture viewpoint as a dependent variable, mixed effects logistic regression analyses, separating bilinguals in Japanese versus English as repeated measures with participant as the random variable, tested a number of associations including the following independent variables: language of narrative (Japanese/English); residence (USA/Japan); language background of speaker (monolingual/bilingual); gender (male/female); motion event type (rolling down/climbing through/clambering up/swinging across); gesture semantics (manner of motion only/path only/manner and path conflated); argument realization (presence/absence of grammatical subject); semantics of accompanying speech (manner of motion clause/path clause/manner and path clause); verb transitivity (presence/absence of object); discourse status of agent (first mention/maintained/reintroduced); linguistic referential form of agent (lexical NP/ pronoun/zero marking); and position of gesture (aligned with agent/predicate/agent and predicate).

The model that converged with best fit indicated statistically significant main associations between viewpoint and the following variables: language background of speaker, motion event type, and semantics of speech. Specifically, C-VPT was significantly positively associated with events that involved swinging and rolling (as opposed to climbing and clambering) and with monolingualism in Japanese. Further, C-VPT was significantly negatively associated with speech expressing path of motion and presence of grammatical subject.

Results from this corpus support some of the prior research attempting to explain gesture viewpoint. Moreover, we reveal new factors not previously considered and discuss the complexity of this area by proposing differing strengths of predictors of viewpoint selection, with stronger effects of type of event, semantics of associated speech, language background of speakers, and nature of argument realization.

Keywords: motion events, viewpoint, Japanese, English





# Mixed Systems – Context dependency and flexibility of multimodal reference in Kreol Seselwa

Melanie Anna Brueck

University of Cologne (UoC) – Albertus-Magnus-Platz 50923 Köln, Germany

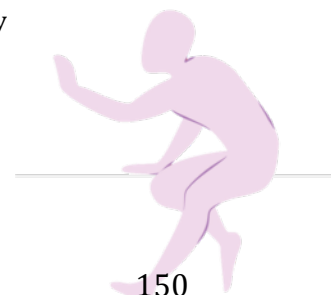
Referring to locations and individuals is part of everyday communication. Spatial and person reference may be expressed by grammatical means such as pronouns, adpositions or demonstratives, or by lexical means such as names or kinship terms. Furthermore, pragmatic factors such as contextual information may also influence the form of a referential expression. Since human communication is inherently multimodal, the establishment of a referent frequently involves additional gestures. Referential gestures are often representational, i.e. enacting or modelling a referent, or deictic, i.e. establishing a direct or indirect indexical link to the referent (Kita, 2003; Mittelberg, 2013; Stukenbrock, 2014). Furthermore, gestures may refer back to already established referents by catchments, i.e. the repetition of certain phonological features (McNeill, 2000).

Reference seems to depend on many different factors, such as cultural and social conventions, context, and shared knowledge (Enfield & Stievers, 2007; Garde, 2013; Haviland, 1993; Levinson, 2003). As previous studies have shown, this sociocultural, contextual and interactional motivation can also be assigned to speech-gesture interaction (Brück, 2015; Enfield, Kita, & Ruiter, 2007; Kendon, 2004; Le Guen, 2011). The interaction between these systems, i.e. the factors mentioned above as well as the two modalities, is very dynamic and usually involves simultaneous mixing on several levels.

The paper analyses the dynamics of multimodal reference to space and individuals in Kreol Seselwa (KS), a French-based creole language spoken on the Seychelles. A mix of systems can be witnessed on three levels: the mixed cultural and linguistic heritage of KS and its speakers, the mix of modalities used for achieving reference, and the dynamic employment of the different referencing strategies available to spatial and person reference.

The first part of the paper will give a brief overview of the theoretical approaches to multimodal reference and the interaction of speech, gesture, and culture. Furthermore, the characteristics of KS as a creole language as well as the cultural background of its speakers will be described. The second part will analyse data collected in 2014/2015. The data strongly suggest that KS speakers employ multiple referencing strategies to refer to a location or an individual in a very context-dependent fashion, involving both vocal and gestural means. Reference to space is found to dynamically rely on both a relative and an absolute frame of reference depending on context, modality, and availability of shared cultural knowledge. Person reference seems to be equally flexible, often involving ad-hoc ascriptions of metonymic gestures, frequent changes of viewpoints and a general context-dependent reduction of explicit reference in both speech and gestures. Finally, the third part will discuss the findings in the light of the specific language ecology of KS, highlighting the indispensability of integrating vocal, gestural, and cultural aspects for the analysis of communicative patterns.

Keywords: co, speech gesture, person reference, spatial reference, language ecology, hybridity



# 'It's always nice to see you, Watson.' The Reception of Multimodal Irony in Film Translation

Paulina Burczynska

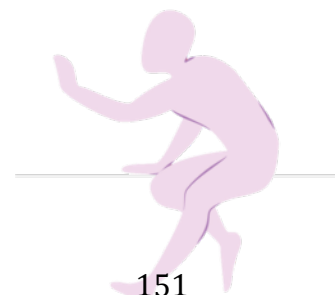
The University of Manchester [Manchester] (UoM) – Oxford Rd, Manchester M13 9PL, United Kingdom

The study of verbal irony has been widely explored in the fields of literary studies, linguistic philosophy and cognitive linguistics – and, in particular, pragmatics. More recently, research on verbal irony has been attracting growing attention from “non-verbal researchers” and audio-visual translation scholars. Nevertheless, the number of conducted studies on the correlation between verbal and non-verbal resources of film language in the analysis and transfer of irony in audiovisual texts is still limited. Against this backdrop, it is important to investigate what and how non-verbal resources like gestures, facial expressions, sounds as well as camera movements and editing techniques contribute to the construal, translation and thus reception of multimodal irony. The aim of the presentation is twofold. First, I will investigate the multimodal construal of irony in the selected scenes of two recent adaptations of Sir Arthur Conan Doyle’s Sherlock Holmes stories, i.e. *Sherlock Holmes* (2009) and *Sherlock Holmes: A Game of Shadows* (2011) subtitled and voiced-over into Polish to find out how irony is construed and relayed in the film text drawing on several modes of film language, i.e. *mise-en-scène*, cinematography, editing and sound.

Second, I will analyse the contribution of non-verbal semiotic resources to irony reception and comprehension in the subtitled and voiced-over version of the *Sherlock Holmes*’ films by three groups of Polish viewers at different levels of English knowledge. The experimental part will reveal how the target audience retrieves ironic meaning and to what extent gestures, body movements, facial expressions as well as sounds, camera position and editing techniques help viewers understand multimodal irony depending on their level of source language.

The data set is interrogated using a mixed-methods approach consisting of observational tools, questionnaires and eye-tracking. The observational phase involves multimodal transcription of selected fragments in which irony plays a pivotal narrative role to determine what non-verbal modes contribute to the multimodal construal of irony and how irony is relayed in the Polish translation. The experimental phase will combine the use of eye-tracking technology and questionnaires for the purposes of triangulation. The eye-tracking based study will reveal how Polish viewers locate their attention on screen to retrieve non-verbal semiotic resources, in particular gesture, facial expressions, and body movements, when watching selected fragments of the films. The administration of questionnaires, on the other hand, will elucidate how viewers of the translated Polish versions of the two films are able to retrieve ironic meaning in the original films.

Keywords: multimodal analysis, audiovisual translation, verbal irony, non, verbal resources, eye, tracking



# Content-biased and coordination-biased selection in the evolution of expressive forms in cross-signing

Kang Suk Byun, Sean Roberts, Connie De Vos, Stephen C. Levinson, Ulrike Zeshan

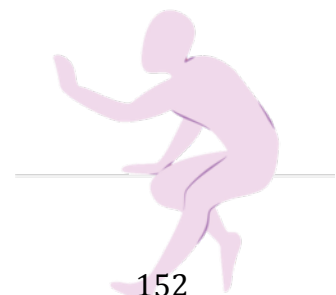
Kang Suk Byun – Wundtlaan1, 6525XD, Nijmegen, Netherlands

This paper studies communication among deaf sign language users with highly divergent linguistic backgrounds who have no signed or written language in common. It constitutes the earliest, least conventionalised stages of improvised communication, called "cross-signing" (Zeshan 2015), as opposed to the semi-conventionalised contact language International Sign (e.g. Supalla & Webb 1995). The specific focus here is on the evolution of the shared repertoire amongst signers over several weeks as they co-construct meaning across linguistic and cultural boundaries. We look at two possible factors influencing the selection of expressive forms (cf. Tamariz et al. 2014): content-bias (where the more iconically-motivated, and/or easily-articulated form is selected) and coordination-bias (where participants attempt to match each other's usage). The data set consists of a 320-minute corpus of first encounters between dyads of signers of Nepali Sign Language, Indian Sign Language, Jordanian Sign Language and Indonesian Sign Language. Recordings took place at the first meeting, after one week, and after three weeks. The participants vary naturally with regard to their linguistic and international experience as well as their age of sign language acquisition. In addition to spontaneous conversations, we collected structured dialogues using a Director-Matcher task. In this language elicitation game, the Director has the coloured images and the Matcher has identical but black and white images alongside a set of colour chips from which they need to select based on the Director's descriptions. We coded and examined the various colour expressions exploited by the participants. The semantic field of colour was chosen for this investigation into the evolution of shared communication for two reasons: the visual domain of colour retains sufficient levels of abstraction while affording signers with iconic potential.

Participants initially used a range of strategies, including pointing, articulating signs for common objects with that colour (e.g. referring to a common iconic sign for 'tree' and pointing to the base to mean 'brown'), and their own native variants. However, three weeks later these individuals all start using the same forms, e.g. the Indian signer's variant for 'green' and the Nepali signer's improvised 'tree-trunk' variant for 'brown'. The iconic motivation of the latter and the ease of articulation of the former suggest that the content-bias is in play. The coordination-bias also seems influential in the group's eventual selection of one variant (cf. Tamariz et al. 2014). We explore these and further factors that may affect the two biases in the selection of forms within our data.

We also consider participants' meta-linguistic skills (Zeshan 2013) and fluency in multiple sign languages (Byun et al. in preparation).

Keywords: cross, signing, evolution, selection



# Pointing and grasping in deaf and hearing infants: insights into the relationship between hand-preference and language lateralisation

Stéphanie Caët <sup>1</sup>, Jacqueline Fagard <sup>2</sup>

<sup>1</sup> Univ. Lille, UMR 8163 - STL - Savoirs Textes Langage, F-59000 Lille, France (STL) – Université de Lille – France <sup>2</sup> Laboratoire Psychologie de la Perception, 45 rue des Saints-Pères, Paris, France

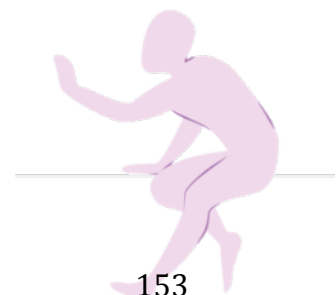
In this paper, we study the use of grasping and pointing gestures in deaf and hearing toddlers as a window into the relationship between hand-preference and language lateralisation. Because 90% of the population processes the segmental aspects of language in the left-hemisphere (Knecht et al., 2003) and 90% of the population is considered to be right-handed (Perelle & Ehrman, 1994), it has long been considered that hand-preference and language lateralisation are strongly or even causally related. However, the exact nature of the relationship between both asymmetries is still under question and it could also be that these lateralisation processes are independent, or that they are independently linked to the same factors (Fagard, 2013). One way of investigating this issue is to study the onset of hand-preference and language lateralisation in the same children, comparing typical and atypical contexts of development.

In this study, we investigated the development of hand-preference for grasping objects and for performing prelinguistic gestures, i.e. pointing, in deaf and hearing toddlers. Grasping and pointing are in fact two behaviours realized with the same tool: the hand, which can be observed from very early on. Because they do not have access to language input in utero, deaf children's early language experience differs from that of hearing infants. On the other hand, precocious factors that may influence the development of hand-preference for grasping such as the position of the foetus in utero are comparable. Following the hypothesis that both asymmetries develop independently, we thus expected that when tested early, hand-preference for grasping would be comparable in deaf and hearing children, whereas deaf and hearing children would show different preferences when producing pointing gestures.

Sixteen 8-25-month-old bilaterally and congenitally deaf infants were tested and compared to hearing infants matched on age, gender as well as parents handedness, using the Bishop test for grasping (Bishop et al., 1996) also adapted to a pointing situation.

Results show that deaf infants use their left-hand for grasping objects more than hearing infants, whereas for communicative gestures, deaf and hearing infants show a comparable strong preference for the right-hand. These results, which go against our predictions although they argue in favour of an independent development between hand-preference and language lateralisation, will be discussed in relation with parents' auditory status, age when hearing aid was started, nature of hearing aid at the time of the study and nature of language input from birth (mainly oral, multimodal or visual).

Keywords: Developmental psychology, handedness, language lateralisation, pointing, deaf children



# Does task matter more than language? A cross-linguistic comparison of bimodal cohesion in instructions

Emanuela Campisi, Marianne Gullberg

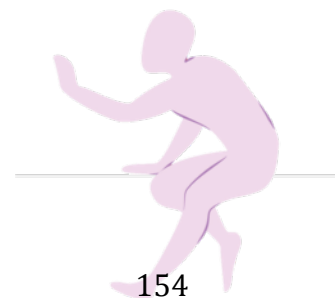
Lund University [Lund] – Paradisgatan 2 Box 117, SE-221 00 Lund, Sweden

For communication to be successful, speakers must refer to entities coherently across discourse, differentiating between entities introduced for the first time, maintained across longer stretches, and reintroduced after a gap (Givón, 1983; Hickmann & Hendriks, 1999). Interestingly, languages differ in the way in which they do this in speech. Unfortunately, very little is still known about the contribution of co-speech gesture. A few studies show that gestures closely mirror the information flow in speech, for instance occurring with new information rather than old (Debreslioska et al. 2013; Gullberg, 2006; Levy & McNeill, 1992; Perniss & Özyürek, 2014). However, it is still unclear how gestures are affected by discursive strategies in different languages and different types of discourse (e.g. narratives vs. instruction). Therefore, the present study asks a) how entities are tracked in speech and gesture during instructions; and b) how these patterns are affected by the language of the speaker. We asked 16 Italian and 16 Dutch native speakers to describe to a naïve addressee how to solve two games (the Tower of Hanoi, and Camelot, a game of arranging blocks to create a path for a prince to reach a princess). The analyses focus on all referential expressions coded for 1) information status (first mention, maintenance, and re-introduction); 2) type of linguistic expression (noun, modified noun-phrase, pronoun, zero anaphora); 3) presence/absence of a concomitant gesture; 4) the function of the gesture (representational vs. pragmatic; Kendon 2004).

Preliminary results suggest that the task affects the outcomes more than language. First, in both languages speakers produce more representational than pragmatic gestures. Second, these gestures mainly accompany new information, confirming previous findings on narratives. Interestingly, the distribution of new and old information differs between the two games, with the Tower of Hanoi leading to more first mentions than Camelot, and therefore to more gestures. Third, referents are described with more elaborated noun phrases in the Tower of Hanoi than in Camelot, where the "traditional" alternation of definitive nouns and pronouns is predominant. As a consequence, both in Italian and Dutch there are more referential expressions accompanied by more than one gesture in the Tower of Hanoi than in Camelot.

The findings, suggesting that bimodal cohesion is achieved differently depending on the nature of the task but not necessarily differently across languages, will be discussed in relation to models of speech-gesture production (McNeill 1992, de Ruiter 2007; Kita & Özyürek 2003) and theories of discourse cohesion.

Keywords: cohesion, reference tracking, instruction, representational gestures



# Levels of Incongruity for Speech and Gesture: Processing Costs

Allison Canfield, Inge-Marie Eigsti

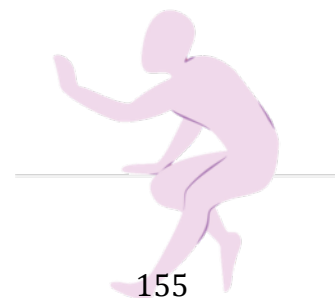
University of Connecticut – United States

Speech and gesture exhibit a bidirectional relationship: Listeners consider both modalities simultaneously. As such, strong incongruities between gesture and speech influence integration more than weak incongruities (Kelly et al., 2010). This study examined the cost of processing incongruent information expressed in a single modality (speech or gesture) versus two modalities (speech and gesture), as compared to processing congruent information.

Participants were 40 undergraduate students, who completed a congruence task. Each trial consisted of a one-second action "prime" (chopping vegetables with a knife), followed by a one-second target video (a gesture, along with a spoken word). Participants indicated whether any part of the target (i.e., speech or gesture) matched the prime video in any way by pressing a "yes" or "no" button. There were three conditions: 1) Congruent (e.g., speech = "chop" + gesture = "chop"; 16 trials), 2) One Modality Incongruent (speech = "chop" + gesture = "cut"; 64 trials), and 3) Two Modalities Incongruent (speech = "shake" + gesture = "stir"; 64 trials). The dependent measures were reaction time (RT) for correct trials and accuracy (i.e., proportion of errors). Trial data were examined for normality of distribution and outliers.

Findings indicated a main effect of condition on RT, such that Congruent < One Modality Incongruent < Two Modalities Incongruent. Each pairwise comparison was also significant (all  $p$ 's < .01); see Figure 1. There was also a main effect on accuracy: One Modality Incongruent < Two Modalities Incongruent < Congruent; again, pairwise comparisons were each significant (all  $p$ 's < .01); see Figure 2. When gesture and speech were semantically congruent with a prime, participants exhibited speedy and accurate performance, as expected. An examination of incongruity, however, revealed differences in speed versus accuracy. Specifically, participants showed a staircase effect on response speed, such that each additional component of incongruity added a 1.5-fold increase in RT, suggesting that incongruity may be processed in an incremental or additive fashion. In contrast, when there was incongruity in one modality only, subjects were less accurate than when both modalities were incongruent. When participants saw videos that contained a single form of mismatch (but also contained a match, such that at least some portion of the target matched the prime, with a correct response of "yes"), they were more inaccurate than when they saw videos with two forms of mismatch (for which "no" was the correct response). These results suggests that incongruence may be more salient than congruence, leading to higher false alarm rates, particularly when the gesture was the source of the incongruity. This may be evidence of a gestural salience or "pop-out" effect for contradictory information, and highlights the integrative nature of gesture processing.

Keywords: gesture, speech, gesture integration, incongruence of gesture information





# Development of iconicity in co-speech gesture and homesign

Erica Cartmill<sup>1</sup>, Susan Goldin-Meadow<sup>2</sup>

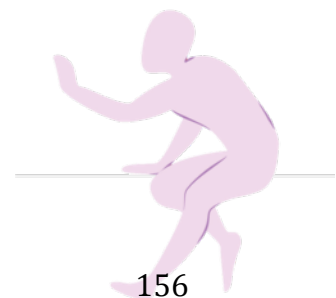
<sup>1</sup> University of California Los Angeles (UCLA) – United States <sup>2</sup> University of Chicago – United States

Iconicity features prominently in manual communication systems, from co-speech gesture to fully-structured sign languages. However, iconic gestures appear relatively late in development, after most children have used pointing and conventional gestures for a year or more. Children sometimes produce iconic gestures in their first two years of life, but it is unclear whether children at this age fully understand the mapping between the form of the gesture and the features of an object or event in the world. Production of iconic co-speech gesture undergoes a rapid period of growth in hearing children around 2.5 years (Özcaliskan & Goldin-Meadow, 2011). Little is known about the cause of this iconic expansion-in particular, if it is a marker of cognitive or communicative development.

One way to address this question is to assess the onset of manual iconicity in cases where it is integral to the primary linguistic structure, i.e., in signed languages. The developmental trajectory of iconicity has been studied in signing children, but results have been mixed. Some studies have reported that children's earliest signs have a high degree of iconicity (e.g., Thompson et al., 2012), whereas other studies found no such relationship (e.g., Anderson & Reilly, 2002; Orlansky & Bonvillian, 1984). Here, we take a different approach by asking how manual iconicity develops in deaf children who lack access to a conventional signed language (so-called "homesigners"). We then compare this growth to the development of iconicity in hearing children's co-speech gestures.

The current study explores the relationships between linguistic development, cognitive development, and manual iconicity by comparing a set of iconic gesture features (hand shape, viewpoint, and movement) in homesign and co-speech gesture during early childhood. Fifty hearing children learning English were videotaped in their homes for ten 90-minute observation sessions from 14-54 months-of-age. These children's gestures were compared to the manual communication of an American homesigning child videotaped during 11 observation sessions from 34 to 54 months-of-age. Handling (where the hand represents a hand) was the dominant hand shape early in development for both homesign and co-speech gesture. Tracer hand shapes (where a neutral hand shape traces an object shape or path) appear later, and object hand shapes are rare throughout (particularly in co-speech gesture). We present a qualitative analysis of gestures with blended representations (in which different hand shapes or viewpoints are combined), and discuss the role of interactional context on gesture use. Developmental similarities in co-speech gesture and homesign suggest that the understanding and use of manual iconicity may develop in common ways across both gesturing and signing children, suggesting that the iconic expansion has more to do with cognitive development than with the development of linguistic structure.

Keywords: development, iconic, representation, hand shape, homesign, co, speech gesture



# Iconicity, phonology, and the creation of a lexicon

Naomi Caselli, Rabia Ergin, Ariel Cohen-Goldberg, Ray Jackendoff

Boston University – United States

Central Taurus Sign Language (CTSL) is a village sign language in the Central Taurus Mountain region of Turkey. Due to cultural, geographical, and financial circumstances, the language has emerged in isolation. In the present study, we compare this emerging language with an established language (American Sign Language) to investigate the role of iconicity in the evolution of the signed lexicon.

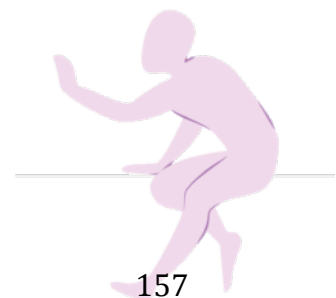
One native hearing CTSL user translated 428 items from Turkish into CTSL. A native deaf ASL user produced translational equivalents of the same items in ASL. Selected fingers (the fingers that move or are foregrounded) and iconicity ratings were generated for both the CTSL and ASL signs. The iconicity ratings were collected from non-signers who rated how much the signs resembled their referent on a scale of 1-7.

Items that were highly iconic in CTSL were also highly iconic in ASL ( $r_s = .57$ ,  $p < .001$ ), suggesting that some concepts are more amenable to iconicity than others. Most ASL signs were rated as low iconicity (median = 3.41). In comparison, there was a flat/normal distribution of iconicity in CTSL (median = 4.2; see Figure 1). CTSL signs were more iconic than ASL signs ( $W = 96,141$ ;  $p < .001$ ). This suggests that iconicity may play a large role in the generation of a lexicon, but over time the role of iconicity is diminished.

Most of the CTSL signs selected either all fingers ( $n = 249$ , 58.1%) or only the index finger ( $n = 157$ , 36.6%). These two selected finger groupings are the only groupings in ABSL (another emerging language; Sandler, Aronoff, Meir, & Padden, 2011), and are the most common in ASL, though other groupings are represented in ASL (see Figure 2). A handful of CTSL signs select other fingers ( $n = 37$ , 8.4%), and these signs are more iconic ( $M = 4.82$ ,  $SD = 1.90$ ) than other signs in the lexicon ( $M = 4.06$ ,  $SD = 1.64$ ;  $W = 5,318.5$ ,  $p < 0.01$ ). In ASL, however, the other groupings are less iconic ( $M = 2.65$ ,  $SD = 1.45$ ) than the two most common groupings ( $M = 3.35$ ,  $SD = 1.74$ ;  $W = 74,457$ ,  $p < 0.001$ ).

Our data suggest that "i" (index finger selected) and "imrp" (all fingers selected) may be the first phonological categories to develop in sign languages and that signs created early in a language's development may be more iconic than later-added signs. Early on, most signs will be i/imrp and iconic; signs with other groupings may select other fingers in the service of maximizing the iconic relation between form and meaning. Later, other phonological groupings will become available and signs will face less pressure to be iconic, leading to the reverse correlation in older languages.

Keywords: iconicity, phonology, village sign language, sign language



# The Relationship between Handedness and Valence: A Gesture Study

Esra Catak <sup>1</sup>, Alper Acik <sup>2</sup>, Tilbe Goksun <sup>1</sup>

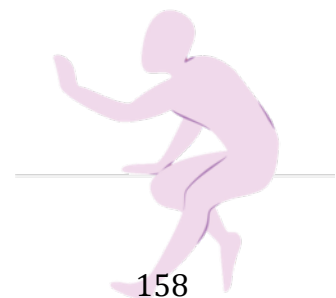
<sup>1</sup> Koç University – Turkey <sup>2</sup> Ozyegin University – Turkey

According to the body-specificity theory, due to differences in interactions with the outer world, left-handed and right-handed people's representations of the world may vary (Casasanto, 2009). People with different hand preferences assign positive and negative emotions to different sides of their bodies and produce co-speech gestures with their dominant hand when the content is positive and non-dominant hand when the content is negative (Casasanto & Jasmin, 2010). In line with this theory, the present study investigates how people's hand preferences influence their comprehension of others' hand gestures that accompany different speech content and how they express emotional content in their gestures. We ask whether (1) right- and left-handed people visually focus on one side of the body more than the other, (2) the extraction of information in gestures differ with the emotional content of stories in both comprehension and production. Participants ( $n = 40$ ) watched 6 videos with negative and positive content while their eye gaze was recorded with an eye tracker. The narrator made 6 gestures for each video including 3 types of hand use: only left, only right, and both hands. The gestures including both hands were separately analyzed for gaze information to see the interaction between hand preference and valence. Additionally, people's gestures were videotaped while they were retelling the story after each video. Spontaneous gestures during retelling were analyzed later for the hand preference, gesture type (beat and representational), and content.

The results indicated no difference in looking preferences with regard to being right- or left-handed,  $p > .05$ . Yet, a main effect of emotional valence was observed for both-hand gestures. Participants spent more time looking to the right side of the screen (actor's left hand) when the information was positive and to the left side (actor's right hand) when the information was negative,  $p < .05$ . No interaction between handedness and valence was found,  $p > .05$ .

Participants' retelling of the negative and positive content revealed a handedness effect only for different types of gestures (representational vs. beat). For beat gestures, right- and left-handed participants preferred to use their dominant hand more (73% and 65% of the one-handed beat gestures, respectively). For representational gestures while the right-handers used their right hand more (83% of the gestures), the left-handers gestured using both hands equally (43% of the gestures). Emotional valence did not influence the hand participants used for gestures. Our study sheds light on the link among handedness, emotional valence, and gesture associations in a novel format using eye gaze information. The lack of significant difference between handedness and emotional content suggests that the body specific mental representations may not extend to the conversational level and possible reasons for divergent results to the body specificity theory will be discussed.

Keywords: handedness, body, specificity, valence, gesture comprehension, gesture production



# Interrupting the Repetitive Gestures of Autistic Individuals – The transformation of solitary behaviour into interactional relevance

Rachel Chen, Kang Kwong Luke

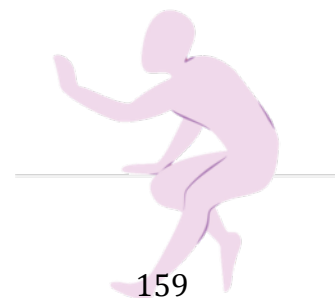
Nanyang Technological University - NTU (REPUBLIC OF SINGAPORE) (NTU) – 50 Nanyang Avenue, Singapore

Repetitive, Restricted Behaviour (RRB) is one of the key features of Autism Spectrum Disorder (ASD), and refers to a class of behaviours characterised as repetitive and rigid (DSM-V, 2013). Although RRBs are traditionally viewed to be driven by a physiological basis (Tuner, 1999), recent studies have sought to find the association between RRBs and the social communication component of the autism phenotype (Hus et al., 2007). Others have posited that RRBs can be an indicator of "social impairment" (Silverman et al. 2010). These studies suggest a possible connection between RRBs and social communication, but to understand the intricacies in their relationship requires a deeper look at the manifestation of these behaviours within their dynamic social situations. In one of the few studies that examine autistic gestures within context, Dickerson et al. (2007) studied the tapping behaviours of two children diagnosed with ASD, which were systematically produced at points where appropriate for the child to provide an answer to the adult's question. They discuss the extent to which these are communicative gestures, rather than being symptomatic of their ASD.

Rather than examining RRBs that respond to a prior turn, this paper instead investigates RRBs that began outside interaction, and how they are transformed in the process of being interrupted. Video recordings of naturally-occurring interactions involving individuals diagnosed with severe autism were obtained from both families and an autism centre, and transcribed following Conversation Analysis (CA) conventions, an analytical framework that allows for a more nuanced understanding of such encounters (Dobbinson, 2010).

We analysed three types of RRB (tapping, flapping, flicking) within the data. In all cases, interruption to their behaviour was met with some resistance - only after repeated effort from their interlocutors to stop the RRBs did they eventually comply. The ceasing was usually preceded with various attempts at avoidance: (1) verbally acknowledging the interruption but continuing the behaviour, (2) modifying volume, physical span and timing of RRBs in alignment with behaviours of interlocutors, (3) adjusting body position gaze direction to hide their ongoing RRB. Participants were flexible in adjusting their RRBs to accommodate to the interaction in various contexts, an act that challenges the rigidity portrayed in stereotyped autistic behaviour. During these cases of interruptions, a transformation of perspective occurs – from being solely involved in engaging in their behaviour, both participants are suddenly made to consider their behaviours not as solitary endeavours, but as gestures within a larger social circumstance. Changing and modifying their RRBs as a result displays not only an understanding of the expectations placed upon them, but their insight on how their behaviour is understood by others.

Keywords: autism, repetitive gestures, eye gaze, interaction, multimodality, conversation analysis



# Visible models of invisible relations: Gesture reveals spatial analogies during reasoning about causal systems

Kensy Cooperrider<sup>1</sup>, Dedre Gentner<sup>2</sup>, Susan Goldin-Meadow<sup>1</sup>

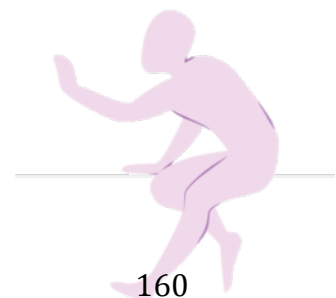
<sup>1</sup>University of Chicago – United States <sup>2</sup>Northwestern University – United States

Speakers commonly produce gestures that spatialize abstract ideas. Prior research on such “metaphoric gestures” has: (a) focused on gestures representing abstract concepts with simple relational structure (e.g. temporal order); and (b) taken individual gestures as the unit of analysis. In everyday life, people often need to reason about more complex phenomena, such as the behavior of economic markets or the dynamics of global climate change. These phenomena are relationally complex in that they involve multiple entities that change over time and that cause changes in each other. What might gesture- and, in particular, sequences of gestures- reveal about how people reason about such abstract, relationally complex phenomena?

In two studies we analyzed the gestures people spontaneously produced when describing causal systems. In a first study (n= 19), after completing a pre-test and reading a written lesson contrasting positive and negative feedback systems, participants explained the key differences. Though the lesson contained almost no spatial language, participants produced spatial gestures in abundance during their explanations (~24 per min). These gestures used space abstractly in four recurring ways: they located the factors in the system (factor reference gestures); they depicted increases and decreases in the factors (factor change gestures); they represented causal relations between the factors (causal relations gestures); and they characterized the overall behavior of the system (whole system gestures). These gestures exhibited consistent spatial properties (e.g. the assignment of factors to the left-right axis) and regularities of form (e.g. the use of gestures with multiple movement phases to characterize whole system behavior). Over the course of their explanations, participants’ gestures often cohered into a larger spatial model of the relational structure of the system- that is, a spatial analogy. For example, factor change gestures were often produced, not in neutral space, but in the location previously assigned to the factor involved; causal relations gestures often involved movement from the location assigned to the causing factor to the location assigned to the affected factor. These spatial gestures were mostly produced in the absence of spatial language, and sometimes in the absence of any language at all. In a follow-up study using the same procedure (n= 24), we removed all remaining spatial language from the written lesson and still observed the same spatial regularities and systematicity in people’s gestures.

These findings enrich our understanding of how speakers use gesture as a medium to express and think about abstract ideas. When reasoning about relationally complex phenomena, people do more than just produce one-off snippets of abstract spatial imagery: they create sophisticated spatial analogies in their gestures that are built up and maintained across stretches of discourse and that are largely independent of spatial language.

Keywords: space, analogy, metaphoric gestures



# Patterns of Total Body Connectivity Expressed in Movement and Drawing

Mary M. Copple, Susanne Eckel

Independent researcher – Germany

How can relations between human movement, imagery, and language be explored? This question was addressed through a series of Bartenieff Fundamentals (BF) movement classes whose participants were asked to make a drawing of the imagery evoked by their movement experience during the classes. Our aim is to gain an understanding of the interfaces between anatomy and physiology and the capacity for creative expressivity through movement.

BF “is an approach to basic body training that deals with patterning connections in the body according to principles of efficient movement functioning within a context which encourages personal expression and full psychophysical involvement” (Hackney 1998/2002: 31). Its goal “is to facilitate a lively interplay of Inner Connectivity with Outer Expressivity to enrich life” (Hackney 1998/2002: 34).

Each class focused on exploring one of the following connectivity patterns, which progressively develop through the neuromuscular system in every human being from birth to adulthood:

1. *Breath* patterning “is the foundation, a ground base, for all patterns which follow” (Hackney 1998/2002: 52).
2. *Core-Distal* connectivity “begins in the center core of the body and radiates out through the torso to the proximal joints, the mid-limbs and all the way to the distal ends of the extremities” (Hackney 1998/2002: 68).
3. *Head-Tail* connectivity enables spinal mobility and support.
4. *Upper-Lower* connectivity enables the upper body and the lower body to each function as integrated units and to articulate effectively together.
5. *Body-Half* connectivity enables each whole side of the body “to provide a supportive stable stance, while the other side practices mobility” (Hackney 1998/2002: 165).
6. *Cross-Lateral* connectivity refers to “a sensation of connection along a diagonal pathway through the body’s core between the body’s cross quadrants” (Hackney 1998/2002: 178), for example, from the right hand to the left foot.

There were 11 participants, none of whom are professional dancers or graphic artists. The duration of each class was approx. 45 minutes. The classes were conducted in German using both words and movement as stimuli to guide the participants through BF warm-up exercises followed by freely improvised movement exploration of the connectivity patterns and the ideas thus inspired. Oil pastels and DIN-A4 paper were subsequently provided for 5-10 minutes to allow visual expression of the imagery evoked while moving. Video data of one participant exploring each pattern supplement the documentation.

The inner impulses that became visible in an outer form through movement, recorded both in the traceforms of the 2D drawings on paper and in the 3D movements performed in space, will be discussed with reference to the work of the movement theorist Rudolf Laban, his student Irmgard Bartenieff and her student Peggy Hackney, and in the light of embodiment theories (Johnson 1987).

Keywords: Laban, Bartenieff, neuromuscular development, creativity, dance, graphic expression



# Viewpoint strategies: manual and non-manual articulators in co-speech gesture and silent gesture

Kearsy Cormier<sup>1</sup>, Zed Sevcikova Sehyr<sup>2</sup>

<sup>1</sup> University College London (UCL) – United Kingdom <sup>2</sup> San Diego State University (SDSU) – United States

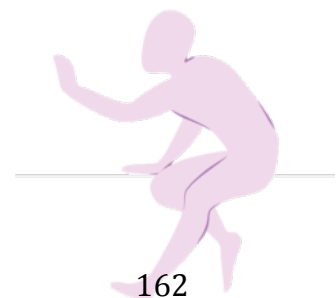
Viewpoint gestures are a subtype of iconic gestures (McNeill, 1992) which are produced from the perspective of a particular referent/character (character viewpoint, C-VPT), from an external observer (observer viewpoint, O-VPT), or both simultaneously (dual viewpoint, D-VPT). Previous work on viewpoint gestures (e.g., Parrill, 2009, 2010) has focused almost entirely on manual productions, even though non-manual articulators (face, head, body) are likely to serve an important role in viewpoint expression (particularly C-VPT) (Stec, 2012). Additionally, although viewpoint gestures have been commonly examined in the context of accompanying speech (co-speech gesture), viewpoint representation in the absence of speech (silent gesture) has been much less studied. Studies that have compared co-speech and silent gesture have found differences between the two, for example, silent gesturers use spatial modification for co-reference more than co-speech gesturers (So, Coppolla, Licciardello, & Goldin-Meadow, 2005). This study examines manual and non-manual viewpoint gestures in co-speech and silent gesture from 22 native speakers of British English. Narratives were elicited using a short excerpt from the Pink Panther cartoon *Keep Our Forests Pink*, which has previously reliably elicited both constructed action (i.e. enactment from a character viewpoint) and entity depicting constructions (cf. observer viewpoint constructions) in deaf signers (Cormier, Smith, & Sevcikova, 2013; Smith & Cormier, 2014). After viewing the clip, half of the participants described the content without further instruction (co-speech gesture condition) and the other half of participants reenacted the content without speech (silent gesture condition).

Productions were coded for use of C-VPT, O-VPT, D-VPT gestures and gestures where no viewpoint was expressed - No-VPT (e.g. pointing, emblems, beats) and all speech was transcribed. Annotations further distinguished between manual-only gestures and gestures that involved non-manual articulations (with or without manual gestures).

Preliminary results indicate a higher proportion of C-VPT gestures in silent gesture (44%, n=331) than in co-speech gesture (23%, n=263), and reversely, higher proportion of No-VPT gestures in co-speech (48%) than in silent gesture (23%). In silent gesture, 83% of C-VPT gestures were produced with non-manual articulators compared to 30% in co-speech gesture. Proportions of O-VPT gestures were similar in both conditions (26%). Although D-VPT gestures occurred infrequently, they occurred more in silent gesture (7%) than in co-speech gesture (3%).

Results suggest that (1) C-VPT gestures play a greater role in silent gesture than in co-speech gesture and replace the higher proportion of No-VPT gestures in the co-speech condition, and (2) the absence of speech, results in strategies that involve a multitude of articulators. The findings emphasise the importance of the body in C-VPT gestures and the need to consider non-manual articulators – rather than just the hands – in gesture research. We will discuss the implications of these findings for both gesture and sign language research.

Keywords: viewpoint, character, observer, nonmanual, pantomime, enactment



# Conducting gestures and the autonomous meaning

Ajtony Csaba

University of Victoria School of Music – University of Victoria 3800 Finnerty Road Victoria BC V8P 5C2 CANADA, Canada

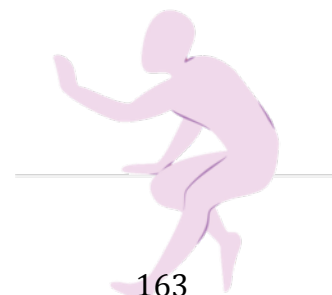
After the 1970's, the increasing influence of visual culture on perceptual habits, the idiomatic programming strategy of orchestra concerts and the permeabilization of performing genres shifted the emphasis of conducting from a primarily norming function to a transmodal complex that incorporates elements of dance, visual performance and the capacity for conveying autonomous content. The corporeal semantics (Leman, 2010) of conducting gestures is traditionally perceived as the modal translation of musical representational gestures and topoi (Hatten, 1994; Agawu, 2014).

This paper disassociates conducting from music performance and examines it as a self-contained, gesture-based discipline in order to explore conducting's volatile relationship to the sounding result and the written musical text in contemporary, standard and historically informed performance practices.

By analyzing a set of video examples that illustrate the extended practice of conducting – from Xavier Le Roy through Bernstein to Soundpainting and solo-conductor performances – I will formulate the idea of a pre-modal seed gesture that conceptualizes the state of expressive impulse before its modal articulation (i.e. before it is articulated through sound, movement or any other modality). The seed gesture will play a central role in discussing the 'kinetic melody' (Luria, 1974) of qualitative conducting movements as a product of transmodal (and reproductive) semiosis (Newfield, 2009). Additionally, I will discuss the process of a seed gesture's modal articulation that leads to the construction of autonomous meaning in conducting, 'framed' (Newfield, 2009) by music, however independent from it.

The concept aims to contribute to the discourse connecting musicology and performance studies with gestural studies, cross-cultural anthropology and neurosciences (e.g. research in multisensory integration), in a relevant way for research-creations and music performance practice.

Keywords: conducting gestures, modal articulation, transmodality\_\_\_\_\_



# Influence of the communicative setting on the use of iconic and deictic gestures in people with aphasia

Carola De Beer<sup>1</sup>, Katharina Hogrefe<sup>2</sup>, Jan Peter De Ruiter<sup>1</sup>

<sup>1</sup> Faculty of Linguistics and Literature Science, Bielefeld University – Germany <sup>2</sup> Clinical Neuropsychology Research Group (EKN), Institut für Phonetik und Sprachverarbeitung (IPS), Ludwig-Maximilians-Universität München – Germany

People with aphasia (PWA) use different types of gestures in their spontaneous communication (Sekine & Rose, 2013). Furthermore, evidence suggests that people with severe aphasia use gestures to compensate for their productive impairment (e.g. Hogrefe, et al., 2013). The assumption of a shared underlying communicative intention of gesture and speech but separate production processes allows for a 'shift' of parts of content from one communicative channel to the other (De Ruiter & De Beer, 2013). However the hypothesis of a mutually adaptive relationship between gestures and speech was rejected in non-impaired speakers (De Ruiter, et al., 2012). Nevertheless, whenspeech production is affected as is the case in PWA, gestures are used to express semantic content that can complement or even replace spoken output (De Beer, et al., resubmitted; Rose, et al., submitted) . In the current study, we investigated how the communicative demands influence the use of speech and gesture in PWA with varying degrees of severity of aphasiacompared to a control group of people without aphasia. We compared iconic gestures and deictic gestures as well as words produced by PWA (N = 12) and a group of non-impaired controls (N = 12, matched for age and sex) in two different communicative settings a) spontaneous conversation and b) a cartoon narration task.

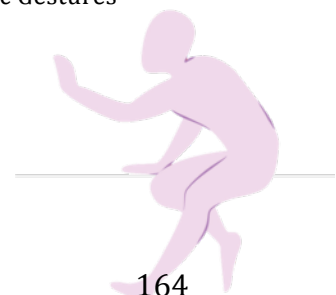
Participants of the control group produced significantly more words per minute compared to the PWA in both communicative settings. We found no significant setting effects for either of the two groups.

PWA produced significantly more iconic gestures (per minute and per 100 words) in the cartoon narration task a) compared to the control participants and b) compared to the spontaneous conversation. Control participants produced more iconic gestures in the cartoon narration compared to spontaneous conversation as well, but this difference was not significant.

Deictic gestures were used more often by the PWA compared to the control group in both settings, this difference was significant for the cartoon narration task (for both measures, gestures/minute and gesture/100 words). The control participants produced significantly more deictic gestures in the spontaneous conversation compared to the cartoon narration task, whereas no significant setting effects were found in the group of PWA.

The results suggest that an increase of the communicative demands affects the production of iconic gestures in PWA. This indicates that PWA used iconic gestures to express semantic content by referring to characters, objects or aspects of actions, which they potentially struggled to refer to verbally. Hence, we found that PWA, not only those with severe types of aphasia, used gestures and particularly iconic gestures to compensate for their verbal difficulties.

Keywords: Aphasia, Communicative Setting, Spontaneous Conversation, Iconic Gestures, Deictic Gestures



# Gesture restriction methodology in repeated-measures research

Ashley De Marchena<sup>1</sup>, Inge-Marie Eigsti<sup>2</sup>

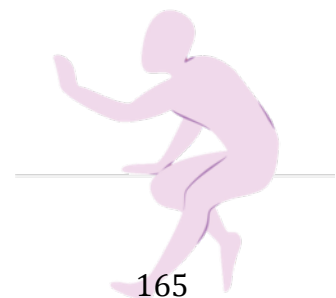
<sup>1</sup> Children's Hospital of Pennsylvania (CHOP) – 34th St. and Civic Center Blvd. Philadelphia, PA 19104, United States <sup>2</sup> University of Connecticut – United States

Gesture restriction paradigms have been used to elucidate the many beneficial roles that gesture can serve for those who produce them, including lexical retrieval (Rauscher, Krauss, & Chen, 1996) and visual-spatial memory (Morsella & Krauss, 2004). Studies using gesture restriction methods typically compare performance on variables of interest (e.g., word finding, working memory) in a restricted condition, in which participants are not permitted to gesture, and an unrestricted condition, in which participants gesture freely. Differences in these variables across restricted and unrestricted conditions are taken to reflect the impact of gesture on these processes. While it is generally assumed that gesture restriction only impacts behavior during the gesture restriction trial itself, the present study indicates that gesture restriction may in fact alter behavior even when participants are subsequently permitted to gesture freely. Adolescents ages 12-16 years ( $n = 36$ ) participated in a larger study on pragmatic language in autism spectrum disorder (ASD). Half of the participants had ASD; effects did not differ by diagnosis, so data were collapsed across groups. Participants viewed 12 dynamic cartoon stimuli, and narrated each cartoon from memory to a research assistant. Gesture restriction was used to examine the impact of gesture use on common ground, i.e., communicating when knowledge is shared between interlocutors. Narrations were thus provided in two crossed, counterbalanced, conditions: with and without gesture restriction (4 alternating blocks of 3 stories), and with and without shared knowledge (6 blocks of 2 stories). Cartoon stimuli were presented in the same order for all participants.

Results revealed a main effect of order,  $p=.01$ ,  $h^2p=.19$ , such that participants who began with restricted gestures told longer stories overall. There was an order  $\times$  restriction interaction,  $p<.001$ ,  $h^2p=.53$ , with a large effect size. Participants randomized to the gesture-restriction condition for the first block told longer stories in all gesture-restriction blocks,  $p<.001$ , Cohen's  $d=-0.58$ ; participants randomized to the free-gesture condition told longer stories in all free-gesture blocks,  $p=.002$ , Cohen's  $d=0.44$ . Order did not interact with the common ground manipulation,  $p=.05$ ,  $h^2p=.011$ , suggesting that the main order effect observed was driven by the gesture restriction, rather than common ground, manipulation.

These findings highlight the importance of counterbalancing gesture restriction, and analyzing and presenting order effects. If all of our participants had begun the task with their gestures restricted, our findings would have shown that gesture restriction results in longer stories. However, if all of our participants had begun the task with gestures unrestricted, our findings would have suggested that gesture restriction results in shorter stories. A between-subjects design would also have obscured the complex relationship between restricted and unrestricted conditions. Repeated-measures designs are critical for us to fully understand the impact of gesture restriction on cognitive and discursive processes.

Keywords: gesture, speech, gesture integration, gesture restriction, gesture constraint



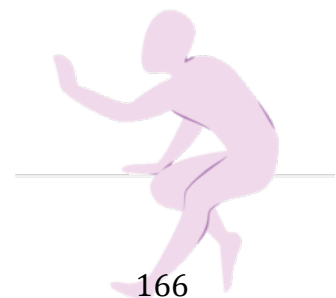
# Multimodal expressions in children's humor productions

Alessandra Del Ré <sup>1</sup>, Christelle Dodane <sup>2</sup>, Aliyah Morgenstern <sup>3</sup>, Marianne Cavalcante <sup>4</sup>, Alessandra Jacqueline Vieira <sup>5</sup>

<sup>1</sup> Universidade Estadual Paulista Julio de Mesquita Filho (UNESP) – Brazil <sup>2</sup> PRAXILING UMR5267 (Praxiling) – CNRS : UMR5267 – Université Paul-Valéry - Bâtiment Marc Bloch (BRED) - Route de Mende - 34199 Montpellier cedex 5 - 34090 Montpellier, France <sup>3</sup> PRISMES – Sorbonne Nouvelle-Paris 3 – France <sup>4</sup> Universidade Federal da Paraíba/CNPq (UFPB/CNPq) – Brazil <sup>5</sup> Univesidade Estadual Paulista - Sao Paulo-Brazil (UNESP) – Brazil

This work results from a collaboration of researchers belonging to NALingua (CNPq-Brazil) and the COLAJE (France) projects, focused on the development of humor, one of the various phenomena in language acquisition process. Children's language gradually develops into rich linguistic constructions contain multiple cross-modal elements which are subtly combined and have coherent communicative functions. Prosody and gesture in particular both facilitate children's entry into language. Balog and Brentari (2008) have shown that as early as the single-word period, children coordinate their verbal and nonverbal behavior both at temporal and directional levels, which makes their meaning more understandable, just like adults do. Combining prosody and gesture allows children to overcome difficulties as they master their first words, their first syntax, their first productions of humor thanks to early multimodal constructions. The goal of humor is to make others laugh because the speaker thinks that her behavior and speech will make them laugh. Humor is connected to our sharing of affects and must be studied in interactional contexts. Humor is based on the production (and comprehension) of a content that is either false or unexpected with the goal of intentionally amusing the other (Hoika, Jutsum, Gattis, 2008). There is thus a distance between reality and its representation (Thommen & Rimbert, 2005). Norrick (2006) insists on the fact that humor is triggered by the awareness of some incongruity - a discrepancy between our representation of an event and reality. In order to find out how children master this phenomenon, we will examine whether children combine prosody, facial expressions and gestures with their first productions of humor. We use 2 longitudinal follow-ups, one in French from the project COLAJE (Morgenstern & Parisse, 2012) and the other in Brazilian Portuguese from the project NALingua. Children have been filmed from 0 to 7 at home one hour a month in spontaneous interactions with their family. They all belong to middle-class families and the parents are all college educated. The videos are entirely transcribed in CHAT format and lined with the videos thanks to the CLAN and ELAN softwares. First results have shown that beyond the intention to make the other laugh, the children seem to want to have fun, to play with words for pleasure, to catch the others' attention or to make fun of them and they do it synchronizing humor verbal productions, prosody and the arm, for example. Besides, in non-verbal infants, multimodal expressions such as laughter and facial expressions have a particular value in performing interactional tasks. Before they can display mastery of language through humor, children can display mastery of communication through laughter, facial expressions and body movements. A natural continuity between visual cues, prosodic cues and humor could therefore be traced.

Keywords: Language acquisition, humor, multimodality



# Rethinking gestural viewpoint as multidimensional rather than a dichotomy

David Deliema, Sweetser Eve

University of California Los Angeles (UCLA) – United States

It is becoming clear in gesture studies that the categorization of gestural viewpoint into Character (C-VPT) and Observer (O-VPT) is too blunt a tool. Our main concern is that this contrasts a category primarily defined in motoric terms with one primarily defined in visual terms. Useful as these metrics are, every gesture has both motoric and visual/spatial structure: they are not mutually exclusive.

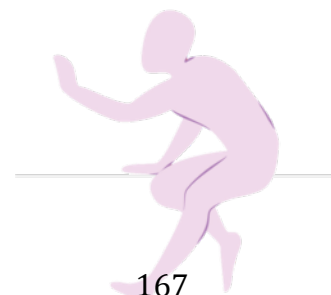
C-VPT definitions foreground the physical mapping between speakers' and characters' bodily routines and/or body parts (cf. Parrill, 2012; Stec, 2013): the label centrally applies to gestures which enact characters' bodily MOTOR ROUTINES, at FULL SCALE, with the same ARTICULATORS that the characters are presumed to have been using, e.g. pumping one's arms to enact a runner. O-VPT definitions foreground the spatial/visual mapping, focusing on depiction of motion trajectories (Parrill, 2012) or the distance of the depicted scene relative to the interlocutor (Stec, 2013). Canonical examples visibly represent PATH and SPEED but not motor routines, e.g. depiction of running by a vertical index finger moving swiftly along a trajectory. Natural correlations exist between these mappings' affordances: whole-body enaction very effectively represents motor routines and represents trajectory less effectively, while "miniaturized" representations show the inverse affordances.

But what about using horizontal flat hands to enact the runner's feet, or using two fingers to represent the runner's legs? The first is perhaps an "uncanonical" C-VPT example, while the second would traditionally be classified as O-VPT. But the two "leg-fingers" still enact the runner's physical routine (and can even "limp" or "trip") – while also normally showing speed and trajectory. Where is the line between C-VPT and O-VPT here? Or should we instead examine the contributions to viewpoint of different kinds of (partially correlated) mapping affordances?

We know that gestural viewpoint is complex and sometimes multiple. A C-VPT can be enacted simultaneously with another C-VPT or with Narrator VPT (Sweetser & Stec, in press). Dudis (2004) gives ASL examples of O-VPT enactment with hands while the face enacts C-VPT reaction to the scene. And some gestures less enact the scene than interact with the scene, such as tracing a heart in the air, shaping the steps of stairs, or highlighting the width of an object. Like the "leg-fingers", these gestures don't fit into a binary C-VPT vs. O-VPT classification; we need a more complex categorization.

We here examine a series of viewpoint phenomena through a lens that separates the physical and visual viewpoint properties of the gesture. We parse viewpoint into dimensions that complexify the classification of the phenomenon: scale, body-part mapping, internal versus external physical mapping, spatial location, and spatial trajectory. We also share an initial proposed typology of gestural viewpoint (see attached diagram) based on this multi-dimensional analysis.

Keywords: viewpoint, gesture, metaphor





## Listening to the "body-scenes" of the patient.

Marie Demahis, Pr. Nathalie Dumet

Centre de Recherche en Psychologie et Psychopathologie Clinique - Lyon2 (CRPPC) – Université Lumière - Lyon II : EA653 – France

If psychoanalysis has preferred for a long time the exclusive use of the verbal language in the understanding and in the psychological treatment of patients (Freud, 1938 ; R. Gori, 1996 ; M-J. Del Volgo, 1997), contemporary researches have emphasised the theoretical and practical limits of it. Regarding the contemporary pathologies, in which actions (auto and hetero-aggressive) are more and more prevailing in the patient's behaviours, they have also highlighted the body language and gestures as suffering and pain conveyors. So wrote J. Mc Dougall in 1989, "I have discovered that the body has its own language".

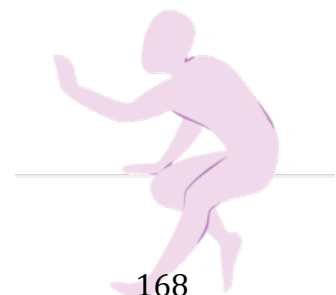
Could we, as an example, re-examine the suspension of patient's movements and therapist's corporeality (respecting the prohibition of touch), while keeping in mind that listening to these factors gives relevant clues in practice ? What about listening to the gestural expression and to this sensory and expressive body in the one on one encounter, towards the patient perspective as well as at the clinician's one ?

Body expression contains plenty of meanings and messages to anyone who would listen. Sharing this point of view, we want to put forward the clinical hypothesis that some patients who suffer from traumatic and inexpressible elements (encrypted in them) (Dejours, 1989 ; Dumet, 2008) would resort to "body-scenes", in extremis, to translate and to express their malaises, their traumas, often without their awareness, giving to another, to see, to feel and to experiment (in this case the psychologist), on consultation time. These "body-scenes" would actualize traumas in the patient history, awaiting to be listened, and even more to be decoded, translated and in this way appropriated by the patient.

Using a case study of a patient met in care facility, suffering from many somatic disorders (enigmatic epileptic episodes, eczema, hyperthyroidism) and addictive streak, we suggest to show the role and the interest at psychic and therapeutic levels, of listening to these "body- language-scenes", during the psychological sessions, from three connected body expressions. The first one is a visual staging of her eczema shared during the consultation, which would bring back her childhood suffering and physical traces of painful contacts. The second one is an enactment, like a mime pretended, of a naked-traumatized body, indicated a pivot-point of care. The third scene playing in handshakes refers to various gestural and tactile reprises, like a corporeal historicity of traumatic and painful contacts in her history, to progressively re-tame contact with the other.

This new way of listening the patient's body language by the therapist, as well as the body-language-conversation between the "body-patient" and "body-therapist", would allow a patient's history of traumas, resulting in his gestures being no more for pain but for a care of body, concomitant with the reduction of somatization disorders.

Keywords: body, scenes, body, language, gestural expressions, a multiform listening, gestural conversation, enactments in therapy, psychotraumatism



# The Thumb Up Gesture: Hypotheses about its Rarity in the Painting from the Middle Ages to the 19th century

Temenuzhka Dimova

Université de Strasbourg - Faculté des Sciences Historiques : EA3400 – 9 rue de l'Université, 67000, France

Nowadays in Western culture, the Thumb Up gesture is massively used to manifest approving and general well being. However, this popular sign is extremely unusual in the painting from the Middle Ages until the 19th century. It is absent from the repertoire of the major iconographic hand signs, which were conceived and used by the painters to achieve narration, devotion or picturesque details in the art works. There is a broad collection of iconographic hand signs including the Pointing index to announce the Logos, the Comput digitis to enumerate the arguments of the scholars, the Intertwined fingers to show the moral pain, the Signum harpocraticum sealing the secrets, and many others. The painters appear to systematically avoid the Thumb Up gesture in all painting genres, including sacred, mythological and historical, as well as in portraits and everyday life scenes.

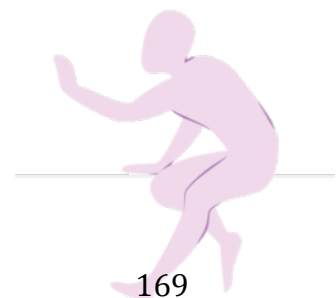
In order to understand this phenomenon, we will take two directions: first of all we will study the rare occurrences of Thumb Up gesture in painting between the Middle Ages and the 19th century, and investigate their meanings; second, we will examine the various connotations of this gesture attributed by ancient treatises about bodily expression. The Thumb Up gesture was popular in the Roman Empire and its usage during the gladiators' fights is still famous. But its signification was frequently misinterpreted, and we will very briefly present the genealogy of the confusion.

In the 14th century, the Sienese brothers Lorenzetti, decided to use the Thumb Up in many of their sacred art works. Considering its extreme rarity in painting, this gesture could be considered as an emblematic signature of their studio. The insistence of the Lorenzetti with this iconographic invention was maybe an attempt to correct the pictorial designation of the words of the Christ (Logos), which was usually represented with the pointed forefinger (Pointing index).

Aside from this sacred usage in the 14th century, the Thumb Up appears meanly in profane painting. A famous example, still very challenging to interpret, is displayed in *The Lunch* (1618) by Diego Velazquez. We will explore few artworks from the 17th century, revealing a specific connotation of this gesture, able to explain its rarity – it is a sign of vulgarity and derision.

Based on a set of important sources for gesture knowledge, as Bonifacio, Bulwer, Palomino, De Jorio and others, we would like to draw the attention on problematic not only regarding Art History but also in the whole field of gesture studies. The questions raised in this historical and iconographic overview, apprised of the dangers of anachronistic reading of popular signs. We will show that the same symbolical configuration can have opposed meanings according to the artistic and chronological context.

Keywords: thumb up, painting, hand's language, history of gesture



# DESCRIPT, a multimodal adaptive learning platform focusing on attention training

Patrick Doan <sup>1</sup>, Rémy Frenoy <sup>2</sup>, Olivier Gapenne <sup>2,3</sup>, Indira Thouvenin <sup>4</sup>, Pierre Steiner <sup>5</sup>, Dominique Boutet <sup>6,7</sup>

<sup>1</sup> Sorbonne universités - Université de Technologie de Compiègne (UTC) EA2223 - Centre Pierre Guillaumat - CS 60 319 - 60 203 Compiègne cedex, France <sup>2</sup> Université de Technologie de Compiègne (UTC) - rue du Dr Schweitzer Compiègne, 60200 FRANCE +33 3 44 23 44 23, France <sup>3</sup> BioMécanique et BioIngénierie (UMR 7338) (BMBI) - Université de Technologie de Compiègne - Centre de recherche Royallieu - CS 60 319 - 60 203 Compiègne cedex, France <sup>4</sup> Heuristique et Diagnostic des Systèmes Complexes (HEUDIASYC) - CNRS : UMR7253, Université de Technologie de Compiègne - Centre de Recherches de Royallieu <sup>5</sup> Connaissance et Organisation des systèmes techniques (COSTECH EA 2223) - Université de Technologie de Compiègne <sup>6</sup> Université Evry Val d'Essonne (UEVE) - Boulevard François Mitterrand, 91000 Evry, France <sup>7</sup> Centre de Linguistique Anthropologique et Sociolinguistique - Institut Marcel Mauss (LIAS - IMM) - Ecole des Hautes Etudes en Sciences Sociales (EHESS), CNRS : UMR8178 - 54 Boulevard Raspail 75006 Paris, France

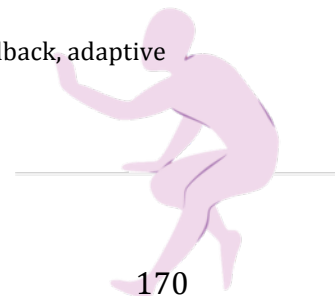
Handwriting learning is a complex activity that implies deep psychomotor and cognitive developments. Although related to writing, calligraphy offers some formal and technical specificities that requires learners to acquire new skills surrounding the pen strokes. Descript is a project that aims at developing an adaptive training platform that helps the subject acquire those skills autonomously.

Despite a strong tradition of teaching calligraphy through the letter forms (morphocinetic dimension of gesture), by focusing on the explicitation of the shapes using detailed models (ductus), learning calligraphy actually relies primarily on the implicit mastering of the pen strokes within dimensions of regularities. Those regularities guide the hand and bring the strokes together in a typical graphic pattern (a topocinetic level of control) that defines each and every style of writing. When assisting a calligraphy trainee, a teacher recognizes patterns of errors. These errors can either be gestural, such as using a limited set of articulations (e.g. fingers) leading to overcompensation; or cognitive, such as a deterioration of attention for spatial organization. From this analysis, the teacher can provide various pieces of guidance by giving verbal advice or demonstrating the gestures. With such training, students build a knowledge based on their experience and the kinesthetic memory of the gestures, which lead them to the acquisition of the control and regularity essential to produce calligraphy. Creating a calligraphy training platform requires making sense of the amount of data acquired from gesture capture, and capitalizing on this created knowledge to reproduce the calligraphy teaching process.

By analysing a corpus of early calligraphic productions (7, 12, 20+ years old), we were able to define how "stroke regularities" are a central component in the course of learning. Those features allow us to target a precise portion of the activity that requires a high level of attentional organization during the performance. Using a Wacom Cintiq tablet, we retrieved and computed numerous features widely used in the literature. Using these features, and a Dynamic Time Warping algorithm, we were able to recognize patterns of error, and hence retrieve sense from data collected from trainees' activity. Such a process make it possible to build a computational model of trainees' activity, and use this modelling to provide them with tailored feedbacks.

In order to study the movements of attention between visuo-spatial and body dimensions, we use a phenomenological technique of investigation that allow us to explore the dynamic and internal nature of attention. Confrontation interviews using video recordings helps us to question such dimensions among expert calligraphers that are performing a standardized writing task (writing the word "minimum"). We will try to recognize and describe the different attentional movements in order to guide the design and implementation of helpful feedbacks.

Keywords: writing, learning, calligraphy, attention, gesture, regularity, machine learning, feedback, adaptive



# A multimodal theoretical and methodological approach to language acquisition: the example of negation

Christelle Dodane <sup>1</sup>, Pauline Beaupoil, Aliyah Morgenstern <sup>2</sup>, Dominique Boutet <sup>3</sup>, Simone Falk <sup>4</sup>, Angelina Vasconcelos <sup>5</sup>

<sup>1</sup> PRAXILING UMR5267 (Praxiling) – CNRS : UMR5267 – Université Paul-Valéry - Bâtiment Marc Bloch (BRED) - Route de Mende - 34199 Montpellier cedex 5 France <sup>2</sup> Langues, Textes, Arts et Cultures du Monde Anglophone (PRISMES) – Université Paris III - Sorbonne nouvelle – UFR du Monde Anglophone, 5 Rue de l'Ecole de Médecine, 75006 Paris, France <sup>3</sup> Structures Formelles du Langage (SFL) – CNRS : UMR7023, Université Paris VIII - Vincennes Saint-Denis – Bâtiment D salle 324 2 rue de la Liberté 93526 Saint-Denis, France <sup>4</sup> Ludwig-Maximilians-Universität [München] (LMU) – Germany <sup>5</sup> University of Campinas [Campinas] (UNICAMP) – Campus Universitario Zeferino Vaz, Barao Geraldo, Campinas - SP, 13083-970, Brazil

Gestures, body movements and prosody provide powerful resources that pave the way for children's multimodal entry into language. One prominent domain to investigate multimodal facilitation is negation. From the end of their first year on, children can express negation with headshakes, index waves or palms-up gestures (Bates, Camaioni & Volterra, 1976; Bates et al., 1979). Around six months later, long before the emergence of the first verbal negation markers, prosody combines with gestures to express refusals, protests or epistemic negations. It is therefore crucial to analyze gestures and prosody with an integrative approach. In this paper, we study the multimodal pathway in children's acquisition of negation speech acts. The goals of the study are 1) to determine to what extent children combine body movements, symbolic gestures and prosody to express their communicative intentions (i.e., negation), and 2) to analyze the respective weight of each modality during language development.

We present data of the longitudinal recordings of a monolingual French girl recorded monthly for one hour between the ages of 1;02 and 2;09 in spontaneous interaction with her parents (Paris Corpus, Morgenstern, 2009; Morgenstern & Parisse, 2012). 96 multimodal productions of the French word non ('no') produced in isolation, and on strings of reduplicated non were analyzed. First, we coded prosodic properties (direction of the intonation contour, accent range, register, duration, intensity; Dodane & Massini-Cagliari, 2010), nonverbal behavior (hand gestures, joint attention expressed through eye gaze and checking behavior, body movement, facial expressions, Morgenstern & Beaupoil, 2015). Second, we compared the prosodic and gestural analyses to look for directional and temporal synchronization patterns.

Results demonstrate the prosodic pathway towards negation from a first vocal "no" at 14 months until 28 months with a better control of the expression of negation (via more adult-like intonation contours and syllabic duration) at a prosodic level. At the non-vocal level, body movements were most often produced in coordination with verbal productions and their direction was mostly synchronized with the direction of intonation contours (e.g., rising contours with rising gestures). The more the child expressed protests against adults, the more she exaggerated both her prosody (higher register, intensity, duration) and her body movements. After 19 months, she used mostly upper-body gestures and movements (head, chest) with a majority of forward and backward or oscillating movements in close parallel with her prosodic contours. As her mastery of speech developed, she gradually stopped exaggerating her prosody and resorted less to non-verbal behavior.

These in-depth analyses are a first step to show how children coordinate their verbal and nonverbal behavior in order to make their negation speech acts more comprehensible (Balog & Brentari, 2008) and how they become experts in face-to-face social interaction, which is multimodal in nature.

Keywords: Language acquisition, negation, gestures, prosody



# The Role of Manual Representational Gestures in Novel Word Acquisition in Children with Specific Language Impairments

Marion Dohen <sup>1</sup>, Anne Vilain <sup>1</sup>, H  l  ne L  evenbruck <sup>2</sup>, Am  lie Rochet-Capellan <sup>1</sup>, Estelle Gillet-Perret <sup>3</sup>

<sup>1</sup> Grenoble Images Parole Signal Automatique (GIPSA-lab) – Universit   Stendhal - Grenoble III, Universit   Pierre Mend  s-France - Grenoble II, Universit   Joseph Fourier - Grenoble I, CNRS : UMR5216, Institut Polytechnique de Grenoble - Grenoble Institute of Technology, 961 rue de la Houille Blanche - BP 46 - 38402 Grenoble cedex, France <sup>2</sup> Laboratoire de psychologie et neurocognition (LPNC) – CNRS : UMR5105, Universit   Pierre Mend  s-France - Grenoble II, Universit   Joseph Fourier - Grenoble I, Universit   de Savoie, B  t Sciences de l'Homme et Math  matiques BP 47 38040 Grenoble Cedex 09, France <sup>3</sup> Centre R  f  rent des Troubles du Langage et des Apprentissages (CRTLA) (CRTLA) – P  le Couple Enfant (HCE) - CHU Grenoble – France

Specific Language Impairments (SLI) affect abilities in speech production and/or perception at several levels, including articulation, phonology, lexicon and syntax. More and more evidence suggests that manual gestures could improve the speech of children with communicative disabilities (e.g. Dunst et al., 2011). Recent studies also show that complementing audio presentation with manual gestures facilitates foreign word learning (Macedonia & von Kriegstein, 2012). Very few research studies have however analyzed the role of manual gestures in language acquisition in children with SLI. This study addresses lexical acquisition in children with SLI using a gesture-based acquisition paradigm. Material: Children were presented with 12 drawings of three types: imaginary characters, houses and vehicles. Each was associated with a two-syllable (consonant-vowel structure) pseudo-word (ex: /nybi/) and a manual representational gesture illustrating its shape. Participants learned a total of 12 words, half presented with a gesture and the other half without (randomly across participants).

Experimental phases: (1) Learning, divided into two sessions (six words each): the child saw a video on a tablet of a speaker uttering the new word with or without a gesture (3 times) and was then asked to repeat the word and gesture if any (3 times). (2) Recall, consisting of 3 phases: designation – naming – designation. Designation: the child heard a speaker utter "Where is the X?" (X representing one of the words learned) and had to select the corresponding image out of six by touching it on the tablet. Naming: the child saw one of the images on the tablet and was asked to name it.

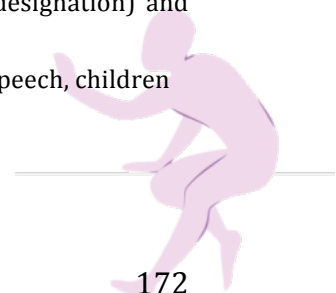
Experimental procedure: The experimental procedure was as follows: Learning 1 – Recall – 30-minute pause – Recall – Learning 2 – Recall – 30-minute pause – Recall. The experiment (approximately 2 hours) took place in a quiet room at the Referent Center for Language and Learning Impairments (CRTLA – Grenoble Hospital). The child sat next to the experimenter. Both were filmed with a video camera.

Participants: 10 children, native speakers of French and diagnosed with SLI at the CRTLA, participated in the study (age: mean=8.3 – sd=1.2, all males).

Analyses: Videos were annotated using ELAN (4.9.1) and a specific annotation grid. Productions of target words (or attempts) and gestures were isolated and labeled (phonetic transcription, type of production...). Designation responses were labeled as correct when the correct image was identified. Speech and gestural naming responses were labeled as correct or incorrect. Incorrect naming responses were further characterized as confusions (with another target word), production errors (incorrect phoneme(s), elisions...) or no response.

Preliminary results: First analyses suggest that when a word is associated with a manual representational gesture during learning, it is learned more accurately and rapidly both in identification (designation) and production (naming).

Keywords: communicative manual gestures, lexical learning, representational gestures, SLI, speech, children



# Gesture and Embodiment in Mathematical Learning: Do Actions Leave a Legacy in Gesture?

Andrea Marquardt Donovan, Martha W. Alibali, Bayley Waters

University of Wisconsin-Madison [Madison] – Madison, WI 53706, United States

The Gesture-as-Simulated-Action framework holds that gesture emerges from spatial representations and mental images, and offers an account of how gestures make embodiment visible (Hostetter & Alibali, 2008). Under this framework, physical experience and actions on objects lead to knowledge that is grounded in action. As experiences are recalled, motor mental images and visual images may come to mind. This imagery, which relies on simulation of actions, has the potential to spread to motor areas and to be realized as gesturing. This perspective implies that, if people learn a concept through action, they may activate those same actions when they later think about the concept. Thus, the actions that they perform during learning may leave a "legacy" in their gestures.

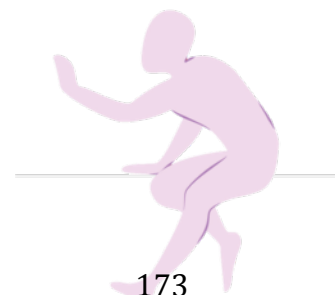
Previous research has explored differences in student performance when mathematical concepts are taught with or without manipulatives. In addition, research has explored children's gesturing as a method of tapping their understanding of mathematical concepts. However, research has not yet explored the effect of manipulatives on learning when a child is offered a true embodied experience where they become the manipulative.

This study investigates children's learning about mathematical equivalence both without manipulatives and using manipulatives that afford different actions, including stacking blocks, using a pan balance, and the child acting as a balance scale themselves. Children ( $N = 34$ ) were assigned to one of four conditions to learn about mathematical equivalence. In three conditions, children were guided to model equations with manipulatives (towers of blocks, a pan balance, or buckets with beanbags). In the control condition, no manipulatives were used.

One prediction of the GSA framework is that speakers should gesture more when they describe ideas with which they have had physical experience compared to ideas less closely tied to action. Children produced gestures at a higher rate in each of the manipulative conditions (blocks  $M = 21.6$ , pan balance  $M = 19.2$ , buckets  $M = 23.1$  per 100 words) than in the control condition ( $M = 12.8$ ). Moreover, children who acted as the balance scale (the child-as-balance condition) produced gestures with both hands at a higher rate ( $M = 5.9$  per 100 words) than children in the control condition ( $M = 2.5$  per 100 words).

Our observations suggest that additional differences in gesture production across conditions may be present. Ongoing data analyses are exploring whether the gestures learners produce when talking about their knowledge reflect actions produced when learning and whether variations in learners' gestures associated with variations in learning.

Keywords: Gesture As Simulated Action, GSA, manipulatives, math, mathematics





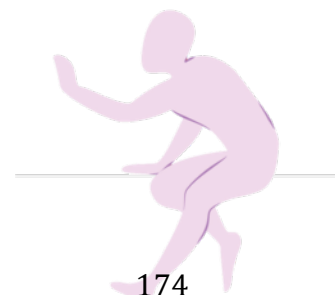
# Visible speech enhanced: What do iconic gestures and lip movements contribute to degraded speech comprehension?

Linda Drijvers<sup>1,2,3</sup>, Aslı Özyürek<sup>1,2,3</sup>

<sup>1</sup> Center for Language Studies, Radboud University Nijmegen (CLS) – Netherlands <sup>2</sup> Donders Institute for Brain, Cognition and Behaviour – P.O. Box 9101 6500 HB Nijmegen The Netherlands, Netherlands <sup>3</sup> Max Planck Institute for Psycholinguistics – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands

Natural, face-to-face communication consists of an audiovisual binding that integrates speech and visual information, such as iconic co-speech gestures and lip movements. Especially in adverse listening conditions such as in noise, this visual information can enhance speech comprehension. However, the contribution of lip movements and iconic gestures to understanding speech in noise has been mostly studied separately. Here, we investigated the contribution of iconic gestures and lip movements to degraded speech comprehension in a joint context. In a free-recall task, participants watched short videos of an actress uttering an action verb. This verb could be presented in clear speech, severely degraded speech (2-band noise-vocoding) or moderately degraded speech (6-band noise-vocoding), and could view the actress with her lips blocked, with her lips visible, or with her lips visible and making an iconic co-speech gesture. Additionally, we presented these clips without audio and with just the lip movements present, or with just lip movements and gestures present, to investigate how much information listeners could get from visual input alone. Our results reveal that when listeners perceive degraded speech in a visual context, listeners benefit more from gestural information than from just lip movements alone. This benefit is larger at moderate noise levels where auditory cues are still moderately reliable than compared to severe noise levels where auditory cues are no longer reliable. As a result, listeners are only able to benefit from this additive effect of ‘double’ multimodal enhancement of iconic gestures and lip movements when there are enough auditory cues present to map lip movements to the phonological information in the speech signal.

Keywords: iconic gestures, lip movements, degraded speech, speech comprehension



# A fine-grained temporal analysis of explicit speech-gesture coordination in ASD

Inge-Marie Eigsti, Molly Waterman

University of Connecticut – 406 Babbidge Road, U-1020 Storrs, CT 06269, United States

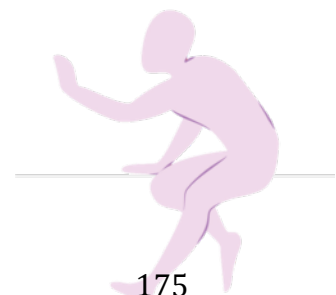
In the literature on autism spectrum disorders (ASD), there are frequent reports contrasting impairments in the spontaneous (non-conscious) production of behaviors such as facial expressions, eye contact, or affective prosody, but with deficits resolved when individuals consciously produce the behaviors. This pattern suggests that the mechanism underlying the behavior is to some extent intact, but that deficits in attention, motivation, etc., impede performance. Communicative gestures have been described as atypical in ASD; such impairments are central to clinical diagnostic measures. However, aside from studies of infants (Iverson et al.) and toddlers (Mundy et al.), the empirical literature does not report clear differences in gesture quantity. Rather, it suggests that gesture in ASD displays qualitative differences in the temporal integration of gestures with speech (de Marchena & Eigsti, 2010). The current study tests whether such deficits are also present when individuals are explicitly directed to coordinate their speech and gesture.

Participants included teens ages 12-16 years with ASD (n=6) or TD (n=9); groups did not differ in age, FSIQ, gender, or standardized language scores,  $p$ 's > .25. Participants recited a series of childhood rhymes (Jack Sprat could eat no fat, Mary Mary quite contrary, etc.) that were printed on a computer screen; at the same time, they were told to "beat" along with their writing hand, as if adding accents to the rhyme. Performance was captured on videotape for subsequent coding.

Coding involved two separate processing streams. First, we examined the audio signal, using Praat to code each of the acoustic peaks in the rhymes, while naïve to gesture timing. This analysis was hand-checked to verify that all acoustic peaks represented true speech emphasis, rather than acoustic artifacts. Second, we coded the video files using ImageJ, which enables the coder to move frame by frame through a video file and to mark x/y pixel locations on each frame; this coding identified the high and low points of the beating hand in the video, while naïve to the speech (acoustic) peaks. Finally, we used a Matlab script to compare peaks in the speech and gesture files, matching each to its nearest neighbor and generating an "asynchrony" variable for each rhyme. Hand-coding of 5% of the data verified the selected peaks.

Results indicated that chronological age was correlated with synchrony, in the ASD group (Figure 1); surprisingly, older individuals were less synchronous. Consistent with previous explicit behavior research, there were no group differences in gesture-synchrony,  $p=.83$ . These findings suggest that there is no fundamental inability in ASD to coordinate speech with at least simple (beat) gestures. Rather, impairments arise when individuals must coordinate gestures with spontaneous (not read-aloud) speech. We discuss implications for theories of gesture and speech planning processes.

Keywords: gesture, autism spectrum disorder, temporal coordination, synchrony



# The ineffabilities of conducting: How choral conductors communicate using gesture

Kathryn Emerson, Victoria Williamson, Ray Wilkinson

The University of Sheffield [Sheffield] (UoS) – Western Bank Sheffield S10 2TN, United Kingdom

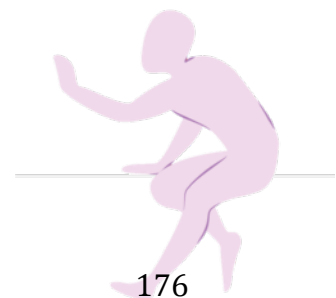
There is a growing body of research examining communicative interactions within music rehearsal and performance (e.g. Szczepak Reed, Reed & Haddon, 2013; Tolins, 2013). This presentation adds to that body of research by using Conversation Analysis (CA) to investigate the interactions between choirs and their conductors during rehearsals. CA was used because it provides an analytical framework which allows a close examination of the interactions that take place in this distinctive interactional environment.

Of particular interest is the unique role that conductors' gestures play in conveying their instructions and ideas to the choir. Gesture is here understood to mean body language, including eye gaze, facial expression and body movement, as well as manual gesticulations. Recent CA work such as Streek (2009) also considers how gesture and body movements are used communicatively within interaction. In this research, interviews with the conductors provide an additional insight into their own thoughts about the gestures they use.

This presentation discusses the use of gesture by conductors particularly in relation to what Schmicking (2006) calls the 'ineffabilities of making music'. Schmicking draws on the definition of 'ineffability' described by Raffman (1993) – "conscious knowledge that cannot be communicated (or communicated exhaustively) in words" (p.6). The ineffabilities of music-making therefore, are the elements that a musician, in this case the conductor, understands but cannot always describe verbally in such a way that another could understand without having first experienced the knowledge for themselves. Schmicking describes three main types of ineffable knowledge: 1) gesture feeling ineffability - the physical experiences of music-making (body posture, physical manipulation of an instrument, breathing etc.), 2) gesture nuance ineffability – aspects of music which we understand categorically, and therefore struggle to describe in more finely-tuned ways (dynamics, pitch, duration etc.), and 3) intersubjectivity/empathetic nuance ineffability - the experience of music-making as part of a group (listening to each other, musical dialogues between performers).

Traditionally, gestures have generally been considered to be vaguer than language in conveying meaning; however, my data reveal that gestures play a vital role in a conductor's communication with their choir and perform interactional functions that would be more difficult to convey using spoken language. I examine how and when their gestures are used to assist, complement or replace talk during choir rehearsals, particularly when the conductor is trying to convey something that could be classed as 'ineffable'. Schmicking notes that the types of ineffabilities he considers are not exhaustive, so I also consider where his categories can be further defined or expanded.

Keywords: conversation analysis, gesture, music, conducting



# Using Gesture to Highlight Key Links of the Second Derivative Test

Nicole Engelke Infante

West Virginia University (WVU) – United States

Knowing how gestures may enhance communication during instruction is critical to developing robust learning environments. While there has been significant research on how students understand the concepts of calculus, there is little research on how incorporating the use of gesture when teaching calculus might facilitate student understanding. We ask: how do instructors naturally use gesture in the calculus classroom to make connections among key ideas and concepts? How does an instructor's gesture use affect student learning of calculus? Mathematics instructors often use gesture when making connections between ideas and concepts. In this research, we focus on instructors' gestures during linking episodes: segments of discourse in which teachers link ideas (Alibali, et al., 2014). We studied how five first semester calculus instructors linked ideas when teaching the topic of optimization, using a dataset of daily video recordings of their classes. A qualitative case study methodology (Cohen, Manion, & Morrison, 2011) was used to examine the natural classroom activities that involved the second derivative test. Each lesson in which the second derivative test was introduced was transcribed and broken down into linking episodes. These linking episodes were then analyzed to determine how many and what types of gestures the teacher used in making links. Links were coded as multi-modal if they were made using some combination of speech, writing, and gesture, and were coded as uni-modal if they were made in speech alone.

Each instructor used a contextually similar example to introduce the second derivative test, but there was significant variance in the number (between 2 and 7) and nature (multi-modal vs. uni-modal) of links used when explaining the concept. Every instructor made two key links: 1) a link between the sign of the second derivative and the concavity (shape of the graph), and 2) a link between the concavity and the function having a maximum or minimum value. Three of the five instructors made every link multi-modally while the other two instructors used multi-modal links about 50% of the time.

The case study methodology revealed that instructors used gestures to link ideas in a range of ways. Several teachers used pointing gestures to graphs, highlighting concavity by tracing the shapes of the graphs, and indicating maxima/minima by indicating specific points. Other instructors represented concavity and maxima/minima using representational gestures in neutral space. One instructor used gesture deliberately, and explicitly drew students' attention to his gestures, stating "Watch! Watch! Watch!" before explaining the concept verbally with gestures that depicted important aspects of the graphical representation.

These findings highlight variations in instructors' use of gesture in communicating key ideas in a lesson. Future research will test whether variations in instructors' instructional communication affect students' learning.

Keywords: teaching, gesture, calculus



# Temporal coordination between gestural and speech units in face-to-face dialogue: anticipation or synchronization/delay

Olga Fedorova <sup>1</sup>, Andrej Kibrik <sup>1</sup>, Nikolay Korotaev <sup>2</sup>, Alla Litvinenko <sup>3</sup>, Yulia Nikolaeva <sup>4</sup>

<sup>1</sup> Institute of Linguistics RAS and Lomonosov Moscow State University – Russia <sup>2</sup> RSUH and Institute of Linguistics RAS – Russia <sup>3</sup> Institute of Linguistics RAS – Russia <sup>4</sup> Lomonosov Moscow State University and Institute of Linguistics RAS – Russia

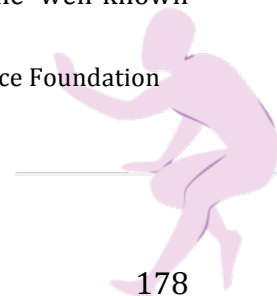
In face-to-face communication, interlocutors combine verbal structure, prosody, manual and facial gestures, eye gaze, and head movements to produce integrated discourse. A key issue of multimodal studies (Gibbon et al. eds. 2000; Kibrik 2010; Knight 2011; Adolphs & Carter 2013; Müller et al. eds. 2014; Kibrik et al. 2015) is the question of coordination between the modalities. In previous research temporal relationships have been identified between (1) gesture strokes/apexes and lexemes (Schegloff 1984; Leonard & Cummins 2009 for English), (2) gesture phrases and intonation units (Loehr 2012 for English; Kida & Faraco 2008 for French), and (3) combination of (1) and (2) (McNeill 1992 for English; Ferre 2010 for French). The results reported in these studies suggest that the onset of a gesture generally precedes the onset of a speech unit. We examine this claim by analyzing temporal coordination between gesture phrases (henceforth, gestures) and elementary discourse units (EDUs, Kibrik & Podlesskaya eds. 2009). To address this question, we explore a corpus of Russian discussions of the Pear Film (Chafe ed. 1980) that includes 24 conversations among 96 native speakers; total duration is 10 hours. We did the recordings with the 100 frames/second industrial videocameras. Data are annotated with the help of PRAAT and ELAN software. This paper is based on a subcorpus including 24 minutes of recording, 1673 EDUs, 614 gestures.

For each gesture, we have identified an EDU to which this gesture is semantically/pragmatically related. We defined nine types of temporal relationships between gestures and the corresponding EDUs: (1) No gaps (the gesture and the corresponding EDU start and end simultaneously); (2) L-internal gap (the gesture starts later than the EDU and they end simultaneously); (3) R-internal gap (they start simultaneously and the gesture ends earlier than the EDU); (4) Both internal gaps; (5) L-external gap (the gesture starts before the EDU and they end simultaneously); (6) L-external & R-internal gaps; (7) R-external gap; (8) R-external & L-internal gaps; (9) Both external gaps. The distributions of the nine types with three degrees of accuracy (the admissible interval of mismatch) of 200ms, 100ms, and 50ms were counted. Predictably, the number of gaps increased significantly with the increase of accuracy.

We divided the nine gesture types into two groups: (i) gesture onset anticipates (5th, 6th, 9th groups) EDU onset; (ii) gesture onset is simultaneous or later than the EDU onset. Under the accuracy of 200ms only 35% gestures were found to belong to the group (i). If the accuracy of 100ms and 50ms is adopted, the share of group (i) gestures increased significantly (44% and 43%, respectively) but did not even reach 50%. Thus our results do not confirm the well-known generalization about the gestures' anticipation of speech.

Research underlying this paper was supported by grant #14-18-03819 from the Russian Science Foundation

Keywords: multimodality, cospeech gestures, temporal coordination, anticipation



# Examining the Gestural Input to Child Homesign

Molly Flaherty<sup>1</sup>, Dea Hunsicker, Susan Goldin-Meadow

University of Chicago – United States

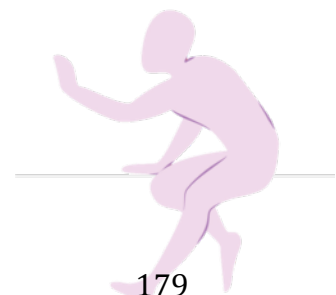
Nicaraguan Sign Language (NSL) was born in the late 1970s with the founding of a new school for special education. Though instruction was in written and spoken Spanish, students soon began to communicate with one another manually. As successive cohorts of students learn NSL, the language is changing rapidly. But how does this new language grow so quickly? Though they did not hear the spoken Spanish in their environment, the children who first created NSL did not start from nothing. They brought with them their homesigns: gestural systems they created to communicate with friends and family. However, homesign systems are not created in a vacuum. Homesigners are born to hearing parents who use gestures when they speak. These co-speech gestures could provide the raw materials for homesign. Hearing US parents who choose to educate their deaf children orally generally use their voices (and gestures) when communicating with their children. In contrast, hearing parents not committed to oral education might use gestures without speech; gestures produced without speech display the linguistic properties of segmentation and hierarchical combination, properties not found in gestures produced along with speech (Goldin-Meadow, McNeill & Singleton, 1996). Homesigners with richer gestural input might create different, perhaps more linguistically complex, gesture systems than children exposed only to gestures that co-occur with speech.

Thirteen deaf homesigning children (9 Nicaraguan, 4 US) were observed at play in their homes with family members. All vocal and gestural utterances directed toward the child were classified based on whether they contained gesture-alone, gesture-with-speech, or speech-alone. All children received utterances of all types, but the proportion varied by culture. Nicaraguan homesigners received many gesture-alone utterances: 45%, whereas US children received few: 8%,  $F(1,10)=7.65$  ( $p=.02$ ).

Next we examined whether the parents' gestures differ in quality. We found that gesture utterances produced by Nicaraguan parents to their homesigning children were longer than those produced by US parents ( $\beta=.34, p=.04$ ). However, when we look within the US and Nicaragua data to see whether gesture utterances produced without speech differ from those produced with speech, we find an unexpected result: gesture utterances produced with speech are longer than those produced without speech, and this effect is larger in Nicaragua than in the US ( $\beta=.39, p<.01$ ). Similarly, in both countries, gesture utterances produced with accompanying speech are more likely to be complex (contain multiple propositions) than are those produced without speech ( $\beta=.87, p<.01$ ).

We find that gesture produced by Nicaraguan (vs. US) parents is more likely to occur without speech. However, we find that this naturally occurring gesture without speech is less complex than gesture with speech. Though Nicaragua proved a fertile place to grow a new sign language, it was likely not because Nicaraguans produce more silent gesture.

Keywords: homesign, gesture, speech, Nicaragua





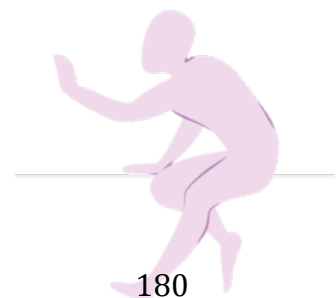
# Hands in motion and hands at rest: The embodied performance of university mathematics lecturing

Chloe Grace Fogarty-Bourget

Carleton University – 1125 Colonel By Drive Ottawa, ON, Canada, Canada

University mathematics instructors have been shown to use a typified embodied way of teaching, regardless of the cultural and national contexts (e.g., Artemeva & Fox, 2011). Instructors perform this way of teaching, or "chalk talk" (Fox & Artemeva, 2011, p. 22), by writing on the chalkboard, providing a concurrent running commentary on what is being written, turning to the students and talking about what has been written, moving from one part of the board to another, pointing at different parts of the board during explanations, looking at the students, and so on (Artemeva & Fox, 2011). In other words, "chalk talk" can be considered multimodal in that it includes speech, writing, movement, gesture, and gaze (Fogarty-Bourget, 2013; O'Halloran, 2005). The proposed presentation reports on a longitudinal empirical study that seeks to develop a robust understanding of verbal and non-verbal strategies university instructors use in mathematics courses to engage students. In addition to gesture theories (e.g., Bavelas, Gerwing, & Healing, 2014; Kendon, 2004) and multimodal (inter)action analysis (Norris, 2011), the study is informed by Rhetorical Genre Studies (RGS) (e.g., Miller, 1984), which sees genres as typified and recurrent social actions and, thus, allows for "chalk talk" to be interpreted as a genre of teaching university mathematics. This presentation focuses on the instances in "chalk talk" punctuated by the instructors' hands being at rest (not gesturing), or "gestural silences" (Fogarty-Bourget, 2015; Huckin, 2002). To investigate this phenomenon, a preliminary taxonomy of gestural silences was developed and applied to the "chalk talk" performances of six university mathematics instructors teaching in different universities in North America. The study suggests that instructors' hands at rest during "chalk talk" carry a specific communicative meaning (cf. Kendon, 2004) and are, therefore, gestures in themselves. Further, the study indicates that despite variance in the teaching location and instructors' educational background, mother tongue, and years of teaching experience, there is a remarkable similarity in the types of deictic and interactive gestures (Bavelas, Chovil, Lawrie, & Wade, 1992) used to elicit feedback and participation from the students, including "gestural silences". The findings of the study also reveal some subtle differences (Paré & Smart, 1994) between the ways that experienced and less experienced instructors perform the genre of "chalk talk". The differences include body orientation, and some gestures and gestural silences used to interact with students. The study has important implications for future research of the role of instructors' gestures in students' engagement, gestural rest positions, and the phenomenon of gestural silence.

Keywords: chalk talk, gestural silence, gesture, interaction, mathematics teaching, multimodality, rest positions, Rhetorical Genre Studies



# Visual-spatial working memory resources modulate multi-modal comprehension

Stephani Foraker

Buffalo State College, SUNY – 1300 Elmwood Ave., Buffalo, NY 14222, United States

Recent research indicates that lower working memory (WM) individuals can benefit from gesturing during speech production, for both verbal and visual-spatial components of WM [1, 2, 3]. However, much research examining comprehension of spoken and written text indicates that individuals with higher verbal WM can better integrate information, including resolving conflicting cues [4, 5, 6]. Here we tested how WM resources affect integration of gestured information during ambiguous pronoun comprehension [7, 8, 9]. We predicted that higher WM individuals would benefit from gestured information during comprehension, for visual-spatial as well as verbal WM components. Comprehenders heard/viewed 24 videotaped discourses. A gesture accompanied each of two same-gender characters as they were introduced by name. In the last sentence during the pronoun, the gesture was a (1) Referent 1 gesture repeated, (2) Referent 2 gesture repeated, (3) Ambiguous 2-handed symmetrical gesture, or (4) No gesture.

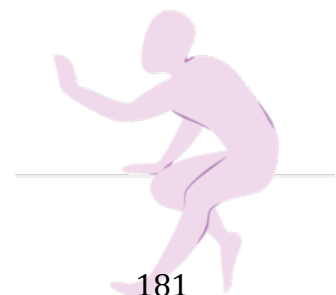
Video: "Craig and Matt went on vacation. Craig[Ref 1 gesture] took a trip to Hawaii while Matt[Ref 2 gesture] took a trip to Florida. He[1/2/3/4] thought the weather was great while on vacation."

At pronoun offset, the 102 participants saw a name probe and decided whether they recognized it from earlier in that discourse. An equal number of Referent 1, Referent 2, same-gender foil, and opposite-gender foil probes were counterbalanced across lists. Accuracy was consistently high for all conditions. We also measured verbal WM with an automated Reading Span task and visual-spatial WM with Symmetry Span [10].

Linear mixed-effects regression models indicated that visual-spatial WM resources predicted pronoun comprehension to a greater degree than verbal WM. For the less recent Referent 1, higher visual-spatial WM benefitted recognition when an ambiguous gesture was seen, and less so for consistent or inconsistent gestures. Those with lower visual-spatial WM, on the other hand, were best in the no-gesture condition. For the more recent Referent 2, however, those with higher WM showed no effect of gesture, but those with lower WM benefitted from gestured information in the matching, mismatching, and ambiguous conditions vs. no-gesture.

Overall, then gestured information is integrated during pronoun comprehension, and does use visual-spatial WM resources, and to a lesser degree, verbal WM. Crucially, when it was necessary to retrieve or refresh a referent representation in memory (Referent 1; [11]), higher WM individuals were better able to incorporate the gestured information, but when extant WM demands were low for a referent still active in memory (Referent 2; [11]), it was the lower WM individuals whose comprehension then benefitted from incorporating gestured information. This evidence is consistent with a multiple constraints approach to co-reference resolution [12], and shows that gesture is an integral part of language comprehension more generally.

Keywords: working memory, pronouns, co, reference, comprehension, co, speech gesture



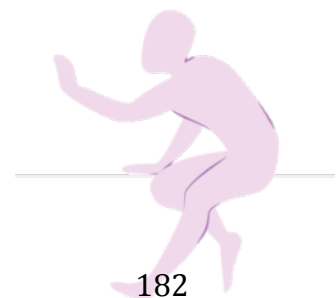
# Mastering simultaneity: The use of mouth actions in Constructed action in German Sign Language (DGS) and French Sign Language (LSF)

Bengt Förster, Marie-Anne Sallandre, Pamela Perniss

Structure formelle du langage : typologie et acquisition, metrique et poétique (SFLTAMP) – CNRS : UMR7023, Université Paris VIII Vincennes-Saint Denis – France

In sign language expression, the visual modality affords the simultaneous use of multiple articulators, including the two hands, face, mouth, head, and torso. Signers exploit this affordance in complex simultaneous constructions, in which different articulators bear independent, but related meaning units. In this way, simultaneous constructions are unique in allowing the simultaneous representation not just of different entities, but also of different perspectives, actions, event components, or participants (e.g. Dudis 2004; Perniss 2007; Sallandre 2007). In narratives, Constructed Action (CA) and Constructed Dialogue (CD) makes abundant use of simultaneity to represent the actions, utterances, or thoughts of referents (Lillo-Martin 2012; Metzger 1995; Pfau & Quer 2010). Research has shown that the acquisition of discourse markers (e.g. perspective shift) and constructions (e.g. classifier constructions, enactment) that characterize CA/CD is not fully mastered until the age of 9-10 (Cormier et al. 2013; Reilly 2000; Slobin et al. 2003; Tang et al. 2007). This late development can be accounted for by complexity on both the articulatory level (mastering the simultaneous use of different articulators) and the cognitive level (e.g. shifting between different referents or handling different perspectives of the same event). Here, we investigate the acquisition of CA/CD from the novel perspective of the integration of manual and non-manual elements, focusing in particular on the use of mouth actions (mouthings and mouth gestures; Balvet & Sallandre 2014; Crasborn et al. 2008; Johnston et al. 2015). Mouth actions are a crucial component of CA/CD, playing an important part in enactment and role shifting devices, but remain understudied with respect to the use and acquisition of CA/CD. Crucially, we compare data from two sign languages (German Sign Language (DGS) and French Sign Language (LSF)), and compare elicited narrative production involving CA/CD by deaf children in two age groups (8-9 years old; 10-11 years old) and deaf adults for each language. Children in both languages are native or early signers. Using existing corpora in the two sign languages, we analyze data from 12 signers from each language (DGS; LSF), with 4 signers in each age group (4 adults; 4 children aged 8-9; 4 children aged 10-11) for each language. We analyze the use and simultaneous deployment of mouth actions with manual features of CA/CD. We compare similarities and differences across the three age groups and between the two sign languages. Annotation and analysis is currently ongoing, but findings promise to provide novel insight into the role of mouth actions in CA/CD and into children's mastery of nonmanual features of expression. The results also provide important typological information about the form of CA/CD in two different sign languages.

Keywords: sign language, simultaneity, mouth action, constructed action, acquisition, visual modality, Deaf, perspective



# Gesture, virtual globes and technological innovation: Metaphorical concepts as basis for gesturally steering Google Earth with Leap Motion

Ellen Fricke , Lynn Ulrike , Daniel Schöller , Thomas Seeling , Angelika Bullinger-Hoffmann

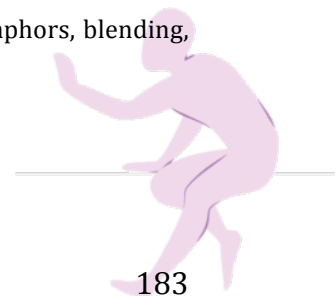
Technische Universität Chemnitz – Germany

This presentation will give first preliminary results of the research project "Hands and Objects in Language, Culture and Technology: Manual Actions at Workplaces between Robotics, Gesture and Product Design (MANUACT)". In this project, hands and objects are investigated from three different perspectives: linguistic-semiotic, ergonomic, and artistic-documentary. Taking an interdisciplinary team approach, the following questions will be addressed: How are descriptions of object handling, tool usage, and machine operation expressed in multimodal utterances (e.g., Streeck 2013)? To what extent are the forms of accompanying hand movements conventionalized? What concepts of handling and object use are culturally anchored, and how? How do these concepts in turn affect the fields of product design and robotics and drive technological innovation processes? Furthermore, how do the resulting products then influence our cultural and linguistic concepts?

The role of the hand is of central importance to technological innovation processes and to describing material culture. Objects and hands mutually condition each other as they develop. Functions of the hand are extended by tools or replaced by mechanical production processes. Reciprocally, objects are specifically designed to be easy for the user to operate (e.g., touch-screens). Moreover, we handle ideas, notions and abstract concepts as if they were manipulable objects (Lakoff/Johnson 1980).

Our first pilot study focuses on the ergonomic testing of the manual steering of Google Earth with Leap Motion. The Leap Motion Controller is a motion-sensing device that one can use instead of a mouse to explore and navigate Google Earth. Without any previous directions and operating instructions for using this new device, informants can be lost in space, sink into the ocean or crash beneath the surface of the earth. Other informants are much better mastering the task to localize the television tower in Berlin. Why is this? Our successful informant used a flat hand representing an airplane for steering the virtual globe. The moving flat hand representing a flying airplane is a conventionalized gesture, as the analysis of multimodal interaction sequences in several German talkshows reveals, and part of a repertoire of at least nearly lexicalized hand movements. Examples like this show, firstly, that the human-machine interface of operating a virtual globe can be improved by using metaphorical concepts like flying an airplane embodied by the hands of the informants ("compression" according to Fauconnier/Turner 2002) and, therefore, support the hypothesis, that technological innovation is also driven by metaphorical thinking. Secondly, they show that human gestures in everyday use are especially suitable as a starting point for the construction of artificial gestures for communicating with robots and steering human-machine interfaces via hand movements.

Keywords: multimodality, co, speech gestures, emblematic gestures, artificial gestures, metaphors, blending, object use, human, machine interface, robotics, technological innovation.



# Planning Units in Speech and Gesture Production

Isabella Fritz, Jeannette Littlemore, Andrea Krott

University of Birmingham – United Kingdom

Studies on motion event gestures suggest that syntactical encoding shapes gestural content (Kita & Özyürek, 2003; Kita et al. 2007). Gestural depiction tended to adapt to the linguistic structure by either conflating or separating manner and path, depending on whether motion events were linguistically encoded within one clause (e.g. “rolling down”) or multiple clauses (“descends as it rolls”) respectively. However, it is unclear whether gestural differences are affected by how information is syntactically packaged or by the way information is lexicalised (verb plus particle or two verbs). In order to test how motion event gestures are coordinated with speech, we kept lexicalisation patterns constant while manipulating the distance between manner (verb) and path (particle) within the same clause.

In Experiment 1, German and English speakers retold short cartoon sequences using prescribed sentence structures. In German the distance between verb and particle was manipulated through clause type: in main clauses speakers had to separate particle verbs by a clause (transl. “The mouse climbs as seen in the video a rainbow up”). In subordinate clauses they had to produce the sub-clause at the start of the sentence and the particle verb appeared combined in the final position (transl. “I see in the video that the elephant a rainbow up-climbs”). Clause type was also manipulated in English but this did not change the order of the particle verb (“I can see in the video that the elephant is climbing up the rainbow” vs. “The elephant is climbing up the rainbow as seen in the video”).

We found that the likelihood of gestural manner and path separation was significantly higher in German main clauses compared to subordinate clauses. No difference was found in English. Since clauses constitute planning chunks (Levelt 1989), this insertion might have caused the verb and particle being in different planning units and hence led to an increase in gestural separation. Would a phrasal insertion lead to the same separation? In Experiment 2 we added a third condition where a phrase had to be placed between verb and particle (“in this short video”). To match clause complexity across conditions, a one clause structure was used for the verb final condition (transl. “The mouse is in this short video a rainbow up-climbed”).

Results from Experiment 2 show that the mere surface distance between verb and particle does not lead to an increase in separated gestures. The inserted phrase condition and the verb final condition were very similar. But both differed significantly from the inserted clause condition. The two experiments indicate that gestural depiction of motion events is not driven by lexicalisation patterns but by how speakers syntactically package information. We concluded that planning units in speech translate to gestural planning units.

## References

Kita, S. and Özyürek, A. (2003) “What does cross-linguistic variation in semantic coordination of speech and gesture reveal?: Evidence for an interface representation of spatial thinking and speaking”, in *Journal of Memory and Language*, 48(1), 16–32.

Kita, S., Özyürek, A., Allen, S., Brown, A., Furman, R., and Ishizuka, T. (2007) “Relations between syntactic encoding and co-speech gestures: Implications for a model of speech and gesture production”, in *Language and Cognitive Processes*, 22(8), 1212–1236.

Levelt, W. J. M. (1989) *Speaking: From Intention to Articulation*. Cambridge, MA: MIT Press.

Keywords: syntax, motion event, production, German

# Iconic Gesture Use

Reyhan Furman<sup>1,2</sup>, Paula Marentette<sup>2</sup>, Elena Nicoladis<sup>2</sup>

<sup>1</sup> School of Psychology University of Central Lancashire (UCLAN) – United Kingdom <sup>2</sup> University of Alberta, Canada – Edmonton, Alberta Canada T6G 2H1, Canada

People gesture as they speak. Yet, considerable variation exists in how frequently adult speakers use gestures as they talk. This variation has been attributed to factors such as speakers' verbal and spatial skills. However, the nature of the relation remains unclear. For instance, individuals with poor visual and spatial working memory have been found to use more deictic and iconic gestures (Chu, Meyer, Folkes & Kita, 2014). In contrast, another recent study has found that high spatial skills and low verbal skills lead to more gesture use (Hostetter & Alibali, 2007). Finally, verbal, but not visuospatial skills have been found to have a negative effect on gesture use in both monolinguals and bilingual speakers (Smithson & Nicoladis, 2013). In addition to cognitive abilities, personality traits are also related to gesture use (Hostetter & Potthoff, 2012). Specifically, extraversion and neuroticism both positively influence the production of gestures.

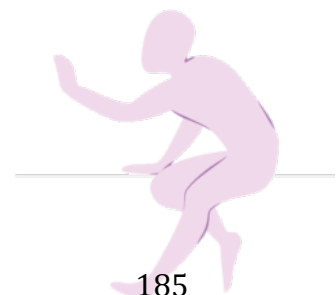
It is well established that speech and gestures develop in close relation throughout childhood (e.g. Bates, 1976; Iverson & Goldin-Meadow, 2005; Özcaliskan & Goldin-Meadow, 2005; Özyürek et al., 2008). Yet, previous studies have focused on the type of gestures that children use, and how these gestures relate to their language or cognitive development. To date, no study has examined why some typically developing children gesture more than others.

The present study examines individual differences in children's frequency of iconic gesture use to determine whether they are related to differences in verbal skills, spatial abilities, personality traits, and memory abilities. Data collection is still in progress. To date, nineteen children aged 4 to 6 (mean age = 5;3) participated in the study. Four tasks were used to elicit iconic gestures: cartoon narration, autobiographical narration, explanation of natural phenomena, and spatial description. We measured children's verbal skills (i.e. vocabulary, phonemic and semantic fluency), spatial skills (i.e. mental transformation ability) and memory (i.e. verbal short-term and working memory, visuospatial short-term and working memory) as well as personality traits using standardized tests.

We used multiple regression analyses to investigate the relationship between children's cognitive skills, personality traits and frequency of iconic gesture use. Preliminary results show that higher frequency of iconic gesture use was related to higher verbal working memory, and poorer visuospatial short-term memory. In addition, gender also influenced gesture frequency such that being a girl was associated with an increase in iconic gesture use.

This is the first study to show that cognitive abilities play an important role in iconic gesture use during children's development. Our results extend previous findings on individual differences in adults' gesture production, and indicate that verbal and visuospatial memory abilities determine how frequently individuals use iconic gestures even at the age of 5.

Keywords: gesture production, development, working memory, verbal ability, spatial ability, personality





# Gestures and iconicity in the creation of language: Insight from silent inventors of Emerging Sign Languages in Brazil

Ivani Fusellier, Luizete Carliez, Ellen Formigosa

UMR 7023 Structures Formelles du Langage (SFL) – Université Paris VIII Vincennes-Saint Denis – France

From what common creative process do human gestuality and iconicity participate on sign language emergence? This question will be treated regarding what relies and systematises the relations between human gestuality, iconicity and emerging sign languages (ESL) from a semiological point of view (Cuxac, 2000, 2005; Fusellier-Souza, 2004, 2006). This approach, integrating the gestural-visual channel semiotics aspects, assumes that all sign languages currently used in the world have had the same starting point based on the same cognitive-communicational process defined by iconization of experience's (Mandel, 1977) anchored in the practical-perceptual world. This process can be observed in the first gesture creation of deaf children and adolescents of hearing parents (Goldin-Meadow, 2003, Morford, 2003) and could be followed in the structural ontogenetic evolution of ESL used by deaf people living in hearing surroundings and in small communities (Yau, 1992, Kegl, J., Senghas, A., and Coppola, M, 1999, Havilland, 2013, Le Guen, 2014).

Some linguistic structure devices focusing on the use of gesture and iconicity of ESL will be examined on 3 topics:

- Lexicon creation: how do gestures of hearing surrounded people participate in the lexical use of ESL?
- Difference between pantomime and iconization process: how do highly iconic structures (transfers unities, Sallandre, 2014) emerge and articulate themselves in a compositional and multilinear organization?
- Lexicon stabilization from iconic structures: how does stabilization of iconic forms come into sight through a system of constraints devices involving use and linguistic economy based on the visuo-gestural modality?

The analysis is based on a corpus of various deaf/hearing signers practicing ESL in Brazil (Brasilia, Marajo's Island and Algodoal's Island). The examples analysed come from a variety of discourse style in interaction (narrative, explanatory, argumentative, metalinguistic) elicited by different authors (Fusellier, 2004, Carliez, 2014, Formigosa, 2015)

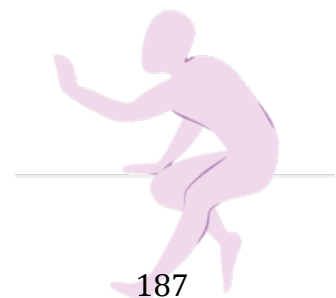
Some theoretical considerations concerning language creation will be proposed:

- ESL emerge from common use of human gestuality and iconization experience's devices. The multidimensional aspects of the visuo-gestural channel considered by the semiological approach allow us to new perspectives on the relations between gestuality and language. The iconic structures displayed on ESL, far from being organized in a static and a linear system, seem to emerge from a kind of rhizomatic root (activated by communication needs) that develops itself linguistically by use and by articulatory constraints of the visuo-gestural-spatial modality (Boutet and al, 2010)
- The role of interaction in the emergence of linguistic structures and the capacity of human individuals to ritualize and to learn these structures (Wilcox, 1999, Slobin 2005).

## Talks

- The community aspect is not an obligatory prerequisite for the emergence of a language. This aspect can be reduced to a limited communicative sphere of two, in which communicative and linguistic activity takes place (Perdue 2003).

Keywords: sign language, gestures, language emergency, iconicity



## Of gestures and signs: the case of directional verbs in sign language

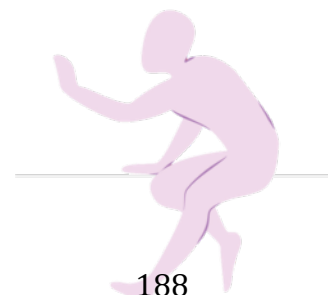
Brigitte Garcia<sup>1</sup>, Antonio Balvet<sup>2</sup>

<sup>1</sup>UMR Structures Formelles du Langage (SFL) – Université Paris VIII Vincennes-Saint Denis – UPS-CNRS, 59 rue Pouchet 75017 Paris, France <sup>2</sup>Savoirs, Textes, Langage (STL) – CNRS : UMR8163, Université des Sciences et Technologies de Lille - Lille I, Université Charles de Gaulle - Lille III – Domaine Universitaire du Pont de Bois Batiment B4 rue du Barreau - BP 60149 59653 VILLENEUVE D'ASCQ CEDEX, France

Of gestures and signs: the case of directional verbs in sign language Sign Languages (SLs) are generally defined as languages using a three-dimensional space, or "signing space", for constructing references. Most syntactic relationships are thus set in this space, by assigning discourse entities a point in space (locus). In most SLs studied so far, a certain category of verbs, usually labelled "directional" verbs, has been identified, in which variations of orientation and movement parameters can be observed. With lexical signs such as [INFORM] in LSF, the ordering of the verb's arguments in space, together with modifications in the sign's outer shape, will convey different readings. These verbs lie at the crux of a debate regarding the applicability of the notion of agreement to SLs. Based on definitions such as that found in Corbett (2006), generativist approaches argue in favor of a formal co-variation between a controller and its target (e.g Lillo-Martin & Meier 2011, Meier & Lillo-Martin 2010). As for cognitive-functionalist approaches (e.g Liddell 2003, Schembri & Cormier under review), these variations in form are seen as indexical and gradient, that is "gestural" and therefore "non- linguistic". In other words, a fundamental divide regarding directional verbs appears, which raises the question of what can be considered as "linguistic" in SLs (see Lillo-Martin & Gajewski 2014).

In this presentation, we wish to propose an alternative treatment of these phenomena, based on the "semiological" model (Cuxac 2000, Cuxac & Sallandre 2007, Cuxac & Antinoro Pizzuto 2010; Garcia & Sallandre 2014). This model integrates the discursive and enunciative dimensions, and considers that grammar in SLs is fundamentally driven by space and iconicity. In this approach, eye gaze is a key element of discourse construction in SLs (see also Antinoro Pizzuto & Capobianco 2008). The semiological model's proposal is that SLs are fundamentally driven by iconic principles, from which stem lexicalized units and non-illustrative structures, as well as non-lexicalized structures (or "transfer units": *mutatis mutandis* role-shifts/"constructed actions" and classifier constructions/depicting signs). Finally, SLs are seen as combining in either a linear or a simultaneous fashion spaces of different kinds: topographic-imagic ones (for transfer units) and diagrammatic ones (for reference construction and semantic relationships). In this light, directional verbs appear as outstanding markers of the combination potential of these signing spaces. We therefore argue that the notion of agreement does not account for the complex combinations of signing spaces used with directional verbs. Based on examples extracted from corpora (Creagest Corpus Garcia & L'Huillier 2011, Balvet et al 2010; LS-Colin Corpus Cuxac et al 2002), we will show that the choice of loci is far from either arbitrary, or non linguistic.

Keywords: french sign language (LSF), sign language, directional verbs, indicating verbs, agreement verbs, agreement, iconicity, space, diagrammatic iconicity, imagic iconicity



# The interrogative palms-rotated gesture in Kagate, a Tibeto-Burman language of Nepal

Lauren Gawne

SOAS, University of London (SOAS) – Thornhaugh Street, Russell Square, London WC1H 0XG, United Kingdom

Across India and Nepal speaker use a particular gesture where both hands are raised rotating the palms towards the self with fingers splayed and the thumb and index finger more prominently extended. The gesture has a recognized interrogative function. Used without speech it is an ‘emblem’ (Efron 1941/1972; Kendon 2004) with a somewhat fixed rhetorical interrogative sense of ‘what to do?’ or ‘who knows?’. With a short upwards head flick it has the sense ‘what are you doing?’ In this paper I look at the use of the palms-rotated gesture in the context of narrative speech in a video corpus of Kagate, a Tibeto-Burman language of Nepal (Author 2013; 2014). When used in tandem with speech this gesture has a pragmatic function marking interrogative speech acts (for pragmatic function of gesture see Kendon 1995 (Italian); Neumann 2004 (German); Seyfeddinipur 2004 (Iranian)).

The gesture occurs in Kagate with some variation in form. Speakers can use one hand or both. The handshape also varies; some speakers splay all fingers (Fig. 1), while others extend the thumb and index finger (Fig 2). For the movement, it can be observed that speakers move their hands upwards, or simply rotate the hands from the rest position. While this gesture across Nepal prototypical involves hand oriented vertically, the majority of interrogative gestures in the corpus involve hands oriented horizontally.

Three main uses of this gesture can be identified in the corpus.

Firstly, the gesture is used with an utterance that has an interrogative grammatical structure, such as the use of an interrogative pronoun (1). (Square brackets indicate gesture preparation and stroke in relation to speech).

1. [tʰi sʰa-gandi] ‘[What to eat?]’ (LL SUY1-14010-02.03:40)

Secondly, the gesture is used with utterances that are not grammatically interrogative, where it indicates to the listener that the speaker is either posing a hypothetical (2) or are uncertain about the content.

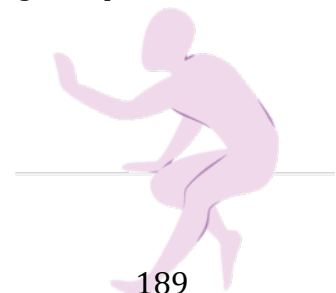
2. yʰe-na-ka [lʰa]-ti sʰa-ge ‘If (the dog) [beg]ged, it would eat’ (KL SUY1-140123-04.02:25)

Thirdly, in pauses in a narrative the gesture can represent a interrogative speech act by itself, most often equivalent to ‘what to say?’. This use without speech is closer to the rhetorical sense of its emblematic function. In (3) the speaker performs the gesture and then asks the echoing rhetorical question.

3. [ ] tʰi lʰap-na? what could I say? (KL SUY1-140123-03.03:46)

This final strategy demonstrates there is a gradation between emblematic and pragmatic uses of the interrogative palms-rotated gesture. Gesture use across Asia is generally under-studied. This paper adds to our knowledge of gestural repertoire in this area by focusing on the interrogative palms-rotated gesture, which is found across national borders and language families.

Keywords: pragmatic gestures, emblem, Nepal, co, speech gesture



# The visual rhetoric of shop window mannequins: A study of mannequins proxemics and postures

Marie Gelang<sup>1</sup>, Emma Engdahl<sup>2</sup>

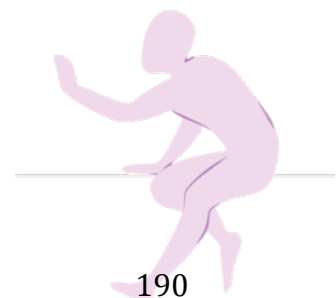
<sup>1</sup> School of Humanities, Education and Social Sciences (HumUS) – HumUS Örebro University 70182 Örebro Sweden, Sweden <sup>2</sup> Department of Sociology and Work Science (SocAv) – Box 720 40530 Örebro Sweden, Sweden

In this paper presentation the visual rhetoric of shop window displays with a special focus on store window mannequins nonverbal expressions, such as postures and proxemics, will be examined. Visual images such as the shop window displays, reflect ideals, norms, values and desires that we embody to create our ethos and personae, i.e., certain aspects of ourselves that we emphasize in a specific situations and our legitimation of them. We will argue that shop windows try to persuade consumers to step into the store through the artistic design and visual rhetoric of mannequins: those embodied media representations of the future consumers that establish gendered ethos in the public sphere. Inspired by visual rhetoric, in general, and non-verbal methods, in particular, the changing ethos and personae of store window mannequin's nonverbal expressions from 1930ies until today are decoded. The empirical material consists of over one thousand pictures of Swedish shopping window displays. Questions that are asked in the analysis of the empirical material are: (1) what ethos and personae do the store window mannequins express through their nonverbal expressions?; (2) are there any differences between the postures and proxemics expressed by the male and female mannequins, as well as within each gender?; (3) in what way does the ethos and personae they express change during modernity?

When analysing what ethos and personae is communicated in the shopping window design we have focused on the nonverbal communication of the mannequins. We have analysed the mannequins' frozen expressions as communicative acts. Similar approaches can be found in research where images such as advertisement, pictures, magazines ads, paintings etc. is examined and interpreted (Goffman, 1976; Hitchon and Reave, 1999; Sturken & Cartwright, 2001). In our study we have singled out two nonverbal communication channels containing several modalities: postures and proxemics. Postures are often analysed from the positions of arms, head, legs and upper body (Matsumoto et al, 2013: 87-89). Since all of these parts of the body can be altered on the mannequins, posture is a pertinent channel of communication to analyse. In earlier research postures is found to communicate attitudinal states, general affect and having a reciprocal relationship with power and dominance (Gelang M. and Kjeldsen, J. E, 2011; Poggi, 2010; Mehrabian, 1968a; 1968b; 1969). Proxemics treats the distances between and among people and includes how space is organized, used and defended (Hall, 1963; 1973). Also proxemics has a close relationship to the nonverbal communication of power and dominance (Guerro et al, 1999).

We will conclude with the result of the analysis of the empirical material where a gender perspective is added as the observation shows differences between as well as within each gender category.

Keywords: posture, proxemics, rhetoric, gender, dominance, mannequins, shop window



## ‘Showing’ in talk-in-interaction

Cornelia Gerhardt

Saarland University [Saarbrücken] – PF 151150 66041 Saarbrücken, Germany

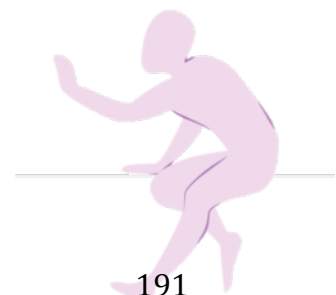
While the practice of ‘pointing’ has received great attention in the literature (e.g. Kita 2003, Streeck 2009), ‘showing’, a kindred gesture which involves the prehension of objects to refer to them, less so. This paper investigates the gesture ‘showing’ in its vocal, verbal, sequential and multimodal gestalt, as a means to shape a specific activity as well as local roles and moral obligations.

In contrast to pointing, the gesture ‘showing’ involves picking up the object referred to and moving it into the projected site of vision of the addressee to establish mutual orientation and, potentially, a joint activity space. It is accompanied by a shift in body position, gaze redirection (from object to addressee), and other (verbal) means such as summons, locatives or demonstratives. ‘Showing’, as (part of) first pair part of an adjacency pair, appears to be a powerful means of increasing the relevance of a response. While the difference between ‘pointing’ and ‘showing’ may be partly based on exogenous criteria, like nature of object or proximity to speaker, the choice between the two is also relevant for the trajectory of the interaction. First, showing allows for manipulations of the object (e.g. ‘exploratory procedures’ Streeck 2009). Also, because of the greater effort it requires and the ensuing closer proximity between speaker and object, it represents a display of greater commitment, closer association or contiguity (cf. also Clark (in Kita 2003) for ‘directing to’ vs ‘placing for’). The gesture ‘showing’ is always only interpretable against the backdrop of the current activity, shaping or constituting it at the same time.

In the main, this paper will concentrate on the specific case of a German father-daughter dyad cleaning the girl’s room and sorting things out, an activity they refer to as ‘aufräumen’. Dad uses an array of prosodic, verbal, and multimodal resources to engage the girl in the activity (e.g. terms of address, questions, positioning of the body, and gaze). This also involves picking up the object under discussion and showing it to the girl. Not only does this make a response from her immediately relevant, also it represents a first step in the practical activity of sorting the room (i.e. moving objects from one place to another). Hence, with the help of this gestures, dad manages to engage the girl in the activity, constructing it as a common endeavour of the two in which she has a moral obligation to join.

Finally, as a conclusion, I will compare this specific use of ‘showing’ to other instances to illustrate the intrinsic connection between activity, roles and gesture, highlighting some of the specific meanings the gesture ‘showing’ can take on because of this interplay.

Keywords: showing, talk, in, interaction, conversation analysis, multimodality, activity





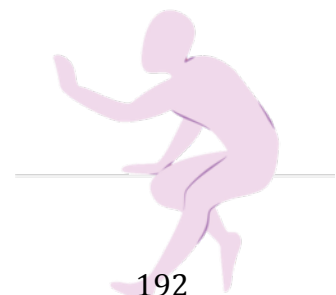
# The interaction of gaze, humor, and smiling in dyadic face-to-face conversations

Elisa Gironzetti, Salvatore Attardo, Lucy Pickering

Texas AM University-Commerce (TAMUC) – United States

Participants in face-to-face interactions rely on visual as well as verbal clues to coordinate and accomplish collaborative actions (Clark, 1996), and may use, for example, smile and laughter to signal that a certain utterance should be interpreted in a humorous way (Clark, 1996: 370). Research has shown that, contrary to what folk theories of humor claim, humor is not marked by higher pitch and volume, and significant pauses (Pickering et al., 2009; Attardo, Pickering, & Baker, 2011; Attardo, Wagner, & Urios-Aparisi, 2011); however, it has been suggested that humor marking may be accomplished by a combination of multimodal cues (Attardo et al., 2013). In the current study, the presence of humor and its markers in face-to-face naturalistic conversations are explored. A multimodal discourse analysis approach was adopted to offer an ecologically valid picture of whether speakers mark humorous events or exchanges by using markers such as smiling and eye-movements. To answer the question of whether and how humor is signaled, we collected a corpus of dyadic face-to-face interactions between adult native speakers of English and Spanish in which canned jokes as well as spontaneous conversational humor were present. For each participant, the following data were collected: (1) high-definition video recordings using a frontal camera for fine-grained frame-by-frame coding of eyes and mouth facial expressions; (2) high quality audio recording using a PZM microphone, which allowed researchers to transcribe the conversation and perform a semantic and pragmatic analysis to identify the presence of humorous events using a triangulation method (Attardo, 2012); and (3) eye movements and fixations using a mobile and non-intrusive Tobii X2-60 eye-tracker overlaid onto the video recording of the interlocutor at whom the participant was looking and with whom s/he was interacting. The video, audio, and eye-tracking data from each pair of participants were then integrated, synchronized, and analyzed in ELAN. The smiling intensity and gestures of the two interlocutors, as well as the co-occurrence of smiling, humor, and eye fixations on the eyes and the mouth of the interlocutor were analyzed in order to determine whether these multimodal phenomena may in fact be used to mark the presence of humor by framing a segment of the discourse as humorous and communicating the metamessage "this is humorous." The results obtained from this project thus far provide evidence for how humorous events are marked by participants in conversation using multimodal cues such as smiling and gaze.

Keywords: humor, eyetracking, smiling, conversation, multimodality



# Cross-cultural differences in gesture use in a narrative task: do Italians really gesture more?

Maria Graziano

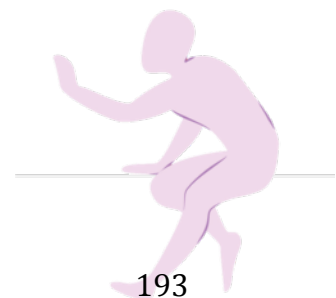
Lund University Humanities Lab [Lund] – Paradisgatan 2 Box 117, SE-221 00 Lund, Sweden

Speech-associated gestures have been documented in a variety of cultures and different languages (Calbris, 1990; Efron, 1941/1972; Kendon, 1981, 1990, 2004; Morris et al., 1979). Cross-cultural variation in gesture use has been observed with respect to different features, such as conventionalization (Calbris, 1990; Kendon, 1981; Morris et al., 1979), language-specific lexical and syntactic patterns (Gullberg, 2011; Kita & Özyürek, 2003; Özyürek et al., 2005), and discourse structuring (Gullberg, 2006; Yoshioka & Kellerman, 2006). Besides these empirical observations, claims about cross-cultural differences in gesture use have mainly been based on anecdotal remarks concerning, in particular, gesture rate. Some cultures, like those in the Mediterranean area, are described as high-frequency gesture cultures in contrast to Northern European countries, considered as low-frequency gesture cultures. The few empirical studies have produced little evidence in support of a clear cross-cultural variation in this respect. For example, Nicoladis et al. (2009) found no evidence in support of their hypothesized frequency transfer effect from French into English, while Iverson et al. (2008) found that Italian children produced more gestures than American children, and Capirci et al. (2010) also report that Italian children use more gesture than French, and both groups in turn more than Americans. Campisi & Özyürek (in prep.), in contrast found no difference in gesture rate between Italian and Dutch speakers. The goal of this study is therefore to investigate cross-cultural differences and/or similarities in gestural behavior in Italian and Swedish adult speakers. These two countries have different cultural practices; and different assumptions have been made about their gestural behavior. Italians are proverbially known for not being able to talk without moving their hands. In contrast, Swedes are generally described as being very reserved, thus less prone to the use of bodily movements (but see Gullberg, 1998).

Analyses were conducted on narrative retellings of an animated cartoon produced in dyadic, interactive settings by 11 Italian and 6 Swedish adult speakers. All stories were transcribed by native speakers. All gestures were identified and following Kendon (2004) were coded for function (referential vs. pragmatic). Gesture rate was measured as the number of gestures produced per 100 words.

Preliminary results indicate 1) that Italian speakers tend to gesture more than Swedish speakers; and 2) that Italians produce more pragmatic gestures than Swedes who, in turn, produce more referential gestures. The data suggest that the two groups differ in gesture rate and also, more interestingly, in gesture function (cf. Gullberg, 1998 for similar results on Swedes and French speakers). However, further analyses are needed in terms of the structural organization of the narratives produced by the two groups of speakers in order understand whether this potential preference in gesture functions is related to cross-linguistic differences in rhetorical style.

Keywords: Cross, cultural variation, Cross, linguistic difference



# How signs can affect the way people gesture about time

Yan Gu, Marc Swerts

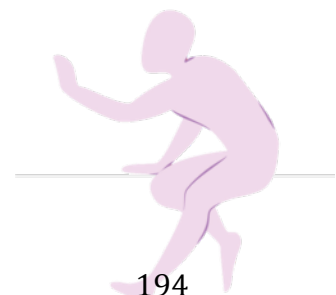
Tilburg University [Tilburg] – PO Box 90153, 5000LE Tilburg, Netherlands

The way people metaphorically represent the concept of time in language can affect how they gesture about time. For instance, English speakers may perform a backward gesture to refer to a past event that lies "behind them" (Casasanto & Jasmin, 2012). Chinese speakers can talk and gesture about time vertically (Gu et al, 2014). Additionally, when gesturing about time in the sagittal plane, Chinese speakers often gesture to position the past event at the front and future event at the back. This could be due to the semantic ambiguity of the Chinese word "front" to indicate both the temporal concept of "early/before" and spatial concept of "forward" (e.g., "front year" literally means "the year before last year") (Gu et al , in preparation). Interestingly, sign language speakers also use spatio-temporal metaphors to express time (e.g, Emmorey, 2001; Pereiro & Soneira, 2004), where Chinese sign language speakers have a deictic sagittal timeline. However, different from spoken Chinese, in Chinese sign languages the spatial "forward" and the temporal "early/before" are signed differently , i.e., "front" is only used for the spatial concept of forward, and the concept of "before/past" is signed towards the back (e.g., Zheng, 2009; Wu & Li, 2012). Therefore, the representation of the sagittal timeline through manual indicators can be different between a sign in Chinese sign language ("before" only signalled with backward signs) and the co-speech gestures in spoken Chinese (e.g, "before" accompanied with forward or backward gestures).

Past studies showed that L2 sign language may affect L1 co-speech gestures in bimodal bilinguals (Casey & Emmorey, 2009; Casey, Emmorey & Larrabee, 2012; Pyers & Emmorey, 2008). The current study is the first to explore whether the experiences of a Chinese sign language influence the production of co-speech gestures about time in bimodal bilinguals.

10 speaking signers (with the Standard Chinese sign language as L2), 40 Chinese monolinguals, and 46 Chinese-English bilinguals performed a word definition task in Mandarin, in which they had to explain seen words as explicitly as possible to an addressee (Gu et al, 2014). Results show that bimodal bilinguals employ temporal gestures far more often in the sagittal axis than the Chinese monolinguals and Chinese-English bilinguals who mostly employ lateral and vertical gestures. Interestingly, in contrast to Chinese-English bilinguals who produce temporal gestures to place past events in front of them, bimodal bilinguals predominately gesturally position the past behind them. The results indicate that the signed language production system affects the co-speech gesture system (cfr Casey & Emmorey, 2009). The theoretical implications for gesture production and spatio-temporal reasoning will be discussed at the conference.

Keywords: bimodal bilinguals, sign, gesture interface, time and space, temporal gestures, Chinese



# Gesture production and working memory in young children

Naziye Gunes-Acar <sup>1</sup>, I. Ercan Alp <sup>1</sup>, Aylin Kuñtay <sup>2</sup>, Ayhan Aksu-Koc <sup>1</sup>

<sup>1</sup> Bogazici University, Psychology Dept. – Bogazici University Department of Psychology 34342, Bebek, Istanbul, Turkey, Turkey <sup>2</sup> Koç University – Turkey

That gesture use is related to working memory (WM) is inferred in some studies (e.g., Cocks, Morgan & Kita, 2011; Sekine, Sowden & Kita, 2015). Studies directly investigating the relation employed adult participants only. Chu, Foulkes, Meyer and Kita (2014) found an inverse relation between representational gestures and visual and spatial WM. Hostetter and Alibali (2007), however, found that low verbal skill and high spatial visualization combination was associated with higher gesture rate. Moreover, both high and low levels of verbal fluency were associated with higher gesture rate compared to the average level.

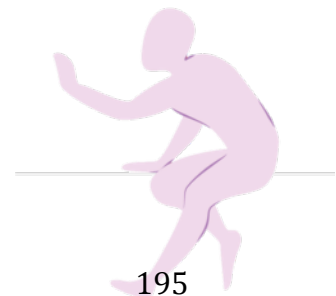
We tested 46 young children (range: 22-42 months; M = 33.7; 20 girls). Non-verbal WM was assessed by the Imitation Sorting Task (IST; Alp, 1994), verbal WM by a Turkish version of the Non-word Repetition Task (NWR; Gathercole & Baddeley, 1989), and gesture production rate by a gesture elicitation task where children are presented with a puppet who performs erroneous actions on everyday objects (Liszkowski & Furman, 2014). The dependent variable, gesture production rate, was calculated as the number of trials (out of six) on which the child produced an iconic gesture, alone or in combination with speech, when responding to the puppet. Receptive language ability was assessed using the Turkish Test of Early Language Development (Topbaş & G'üven, 2011).

Because all the study variables significantly correlated with age, the partial correlations among them are presented in Table1. Even when Age was partialled out, almost all of them were still significantly correlated among themselves. Therefore, we carried out second- and third-order correlation analyses to explore the relation between each type of WM and gesture rate.

When verbal WM was partialled out in addition to Age, non-verbal WM still predicted gesture rate,  $r = .401$ ,  $p = .007$ . However, partialing out non-verbal WM substantially reduced the correlation between gesture rate and verbal WM,  $r = .270$ ,  $p = .077$ . Next, we replicated these last two analyses by further partialing out receptive language ability. Non-verbal WM was still significantly associated with gesture rate,  $r = .369$ ,  $p = .015$ , but verbal WM was not anymore,  $r = .212$ ,  $p = .173$ .

These results show that gesture production in young children is strongly related to non-verbal WM. This finding stands in contrast with the adult findings. However, adult participants are fluent speakers of their language, but children this young typically are not. It seems that, before children become fluent speakers, gesture use is facilitated by non-verbal WM capacity. It may be that they compensate for their speech production difficulties by employing non-verbal means to communicate their intent. Better visuospatial WM, may aid young children's gesture production.

Keywords: gesture production, working memory, young children



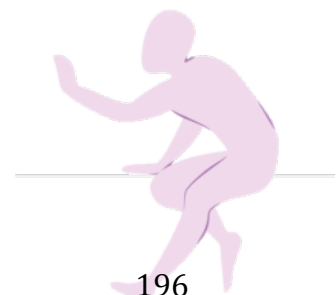
# A comparison between the process of gestural and verbal misinformation in eyewitness interviews

Daniel Gurney

University of Hertfordshire (UH) – United Kingdom

Eyewitnesses can be misled by suggestions made by police interviewers both verbally and nonverbally. While recent research has highlighted that gestures can serve as a robust form of misinformation in eyewitness interviews, little consideration has been given to how salient gestural misinformation is in comparison to the much more established verbal misinformation effect. Given that speech and gesture convey information to interlocutors in different ways, it is also important to consider how comparable the process of misinformation is across these two forms of influence. Two experiments are reported here. In the first, participants were questioned on a crime scene that depicted a theft at a bus stop and, in the second, were questioned on a more severe crime scene that depicted a man being attacked in an alleyway. Across both experiments, participants were interviewed on the crime scene they had witnessed and were given either accurate or inaccurate information about the scene through either speech or gestures. Across both experiments, both verbal and gestural misinformation effects were confirmed, with eyewitnesses incorporating the information that had been conveyed to them into their account of the scenes, both through speech and gesture. Further inspection of the results revealed that gestural misinformation elicited an effect comparable to that of verbal misinformation with no significant differences between the two forms of influence. In an effort to understand the process through which gestures mislead eyewitnesses, participants were also asked to report on whether they could identify the source of misinformation afterwards in an exit interview. It was found that suggestions made nonverbally, through gestures, were less likely to be identified than the same suggestions made verbally, through speech. Therefore, these findings raise the question of whether gestured misinformation is a more covert form of influence interviews that eyewitnesses are more susceptible to. In general, these results highlight gestural misinformation as a considerable force for misinformation in eyewitness testimony that should be given greater consideration in police interviews.

Keywords: gestures, misinformation, eyewitness, memory



# An experimental study of metaphoric co-speech gestures across age groups

Ali Hadian Cefidekhanie

Linguistique et Didactique des Langues Etrangères et Maternelles (LIDILEM) – Université Stendhal - Grenoble III : EA609 – UFR des Sciences du Langage - BP 25 - 38040 Grenoble cedex 9, France

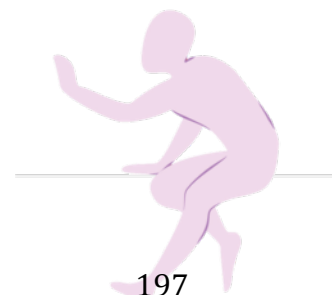
Hand gestures are commonly used to represent abstract entities as well as objects, characters, actions and places in the course of daily talk, oral narratives, expository discourse and argumentation. Gestures convey abstract meanings thanks to their spatial and metaphoric properties (Cienki & Müller, 2008). Developmental studies of children's narratives and oral explanations showed evidence for age-related changes regarding the frequency of use and the formal aspects of gestures of the abstract (McNeill, 1992; Colletta & Pellenq, 2009). Following Goldin-Meadow (2003), we postulate that gesture development is a window into the development of abstraction abilities.

Although gesture production is studied extensively, we don't know much about the processing of gestural information in adults as well as in children. Nor do we know how people detect and process the abstract use of gestures. Boutet (2010) showed that hand gestures selected from the sole physiological parameters (extension / flexion, pronation / supination, etc.) are easily categorized and seen as bearing meanings. The assigned meanings to gestures by the subjects (to appear/disappear, to offer/refuse, to accept/reject, to consider, etc.) applied both to actions and properties of objects in the physical world and to abstract ideas.

Our study aims to compare the pattern of processing and attribution of abstract meaning to hand gestures in three age groups: children, adolescents and adults who first passed a comprehension test of idiomatic expressions to measure their comprehension capacities. We filmed five hand gestures that have both concrete and abstract representational properties, with which we have developed two experimental conditions used in two sets (a "verb" set and a "sentence" set) of two tasks each. In the gesture-only condition (first task), subjects were asked to produce one verb/sentence that was appropriate for each gesture they viewed. And in the bimodal condition (second task), we showed the subjects audio visual combinations of gesture + verb/sentence pairs. They were asked to decide whether each pair was congruent or incongruent. For the second task we used the same gestures from the first task with different combinations of verbs/sentences making up twenty combinations in all, of which half was concrete combinations and the second half was metaphoric. The gesture-only condition was replicated to measure the priming effect of being exposed to bimodal pairs.

We hypothesized that all subjects would have high scores in the second task for concrete combinations, and that adults and adolescents would perform better than children in the second task for abstract combinations. The results suggest that attribution of abstract meanings to hand gestures not only depends on age and verbal context but also on previous exposure to co-speech use of gestures.

Keywords: metaphoric co, speech gestures, abstraction, representational gestures





# The role of gesture in the interaction of a congenitally blind girl and her mother

Anne-Katharina Harr, Anna Bungenstock

Ludwig-Maximilians-Universität [München] (LMU) – Germany

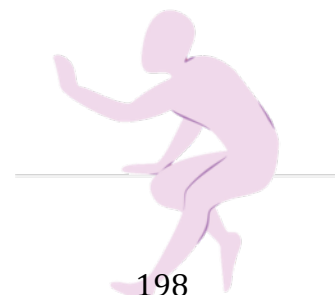
In early communication, children use gestures before they express themselves verbally. They use imperative gestures to indicate that they want to grasp an object and that caregivers should make this object reachable (Mundy et al. 2007). With declarative gestures, children refer to an object/event that they want to share with a caregiver (Behne et al. 2011). Although it is widely acknowledged that the use of declarative gestures is related to social-cognitive skills, its driving force is unclear. Children either use such gestures to give information to another person who needs it (Liszkowski et al. 2008) or to gain new knowledge (Begus & Southgate, 2012). Studies of blind children could provide insights into the role of gesture and speech in early communication. Previous studies on blind children showed that they rarely produce gestures to share their attention and that they hardly refer to distal objects/events (Iverson et al. 2000). In addition, language is expected to play earlier an important role for blind infants. Our paper aims a) to gain insights about the role of gestures in joint episodes with blind children and b) to determine the pragmatic acts that are conveyed by each modality.

We analyzed the gestures of a congenitally blind girl (1;2 to 2;2) interacting with her mother in a semi-structured observational context (Adamson & Bakeman 2013) and compared them to those of a sighted control girl. The data was collected monthly and was coded with respect to the type of gesture used in a joint episode (pointing, showing, giving etc.), their pragmatic function (initiation, response, acknowledgment) and the gesture-speech-relation (semantic information in gesture only, speech only or speech and gesture).

Our results show that the blind girl produced fewer gestures compared to the sighted one, but started earlier to speak. She didn't produce any pointing; however, she used showing to refer to an object she wants to share. In these cases, the mother mostly named the object/event and elaborated on it. In addition, she also used some self-stimulating gestures with a communicative function (Brambring & Tröster, 1992). The sighted girl, in contrast, produced a lot of different gestures. In order to share her interest; she frequently points, but also used some showing gestures. As her vocabulary grows, pointing and showing gestures decreased because she uses speech to refer to the objects/events.

The data shows that gestures have a similar but not equal function for the two girls: Both girls want to share their attention and get the objects/events named. In addition, the blind girl uses gestures to get further information about specific objects/events, whereas the sighted wanted to get the object itself. Our results will be discussed with respect to the driving force of declarative gestures.

Keywords: deictic gestures, blindness, joint attention



# Recurrent gestures – why so recurrent? From utterance level cohesion to broader discursive structures

Simon Harrison

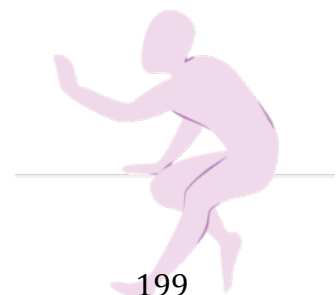
University of Nottingham Ningbo China (UNNC) – 199 Taikang Road, 31510 Ningbo, China

Recurrent gestures were recently defined as a “stable form-meaning unit (that) recurs in different contexts of use over different speakers in a particular speech community” (Ladewig 2014a: 1559-1560). Examples include the ‘palm up open hand’ gesture (Müller, 2004) and the ‘palm down’ or ‘ZP’ gesture (Kendon, 2004). While an understanding of these gestures is beginning to emerge (e.g. Bressemer & Müller, 2014), one aspect of recurrent gestures that requires more attention is their recurrency. For example, Müller’s (2004) analysis of the palm up open hand was based on “about seventy instances” of the gesture over a twelve-minute long segment of conversation. And in the data to be considered here the speaker performs at least 60 strokes of a ZP gesture over her interaction. So why are recurrent gestures (sometimes) so recurrent? To answer this question, the current study applied a bottom-up approach to the analysis of ZP gestures in a spoken interaction in French. This meant working from the micro-kinesic context of individual occurrences of gestures at the utterance level upwards (and outwards) by considering increasingly broad semantic, pragmatic, and discursive structures. The goal of this approach was to be able to retrospectively offer an empirically-based top-down interpretation of the gestural recurrency characterising the interaction.

This approach assumes a ‘form-based’ view on co-speech gestures (Müller et al, 2013) and accordingly employs Bressemer et al’s (2013) three stages of coding: (i) annotation of gestures, (ii) annotation of speech, and (iii) annotation of gestures in relation to speech (and discourse). For the current study, this method was used first to identify and describe all potential instances of ZP gesture in the data. (Only one speaker was coded given the nature of the interaction). This initially yielded 60 ZP strokes embedded within a kinesic context of 30 gesture units containing over 200 gesture phrases. Coding of verbal segments then provided the basis to examine semantic connections between gesture and speech using categories from Calbris’s (2011) study of the gesture (e.g., Quantity, Totality, Directness, and Negation). Each relevant speech- gesture combination was then coded for speech acts at a pragmatic level, which in this data included persuading, assuring, guaranteeing, and warning.

After presenting the data at these different levels, I will discuss how an understanding of the broader communicative purpose of the interaction, the role the speaker was adopting, and the position of this interaction within a chain of related interactions provides a framework to account for the complexity of palm-down recurrency observed at the micro-level. I suggest how the framework could be more broadly applied and connect the discussion to previous work exploring gestures from a perspective of discourse, such as on ‘catchments’ (McNeill, 1992, 2005, 2012; also e.g., Montredon et al, 2008).

Keywords: Recurrent gestures, Negation, Palm down, Open Hand Prone, Discourse



# Height and shape gestures: Profiling different surface areas in competing gesture interpretations

Julius Hassemer<sup>1,2</sup>, Bodo Winter<sup>3</sup>

<sup>1</sup> Universidade de Sao Paulo, Faculdade de Filosofia, Letras e Ciências Humanas – Brazil <sup>2</sup> Research Fellowship 2016-2017 - German Research Foundation, DFG – Germany <sup>3</sup> University of California, Merced, Cognitive and Information Sciences – United States

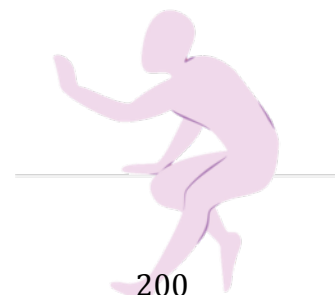
Gesture perception means more than perceiving physical configuration and movement, it crucially also involves inferring abstract forms from the physical articulators, for example profiling specific surface areas of the hand (Sowa, 2006; profiling in general: Langacker, 2008). This paper examines this process for single-handed hold gestures that show an object's height or shape by the index finger and thumb as analysed in Hassemer (in prep.): 'Height gestures' profile the two opposing surfaces at the index finger and thumb pad to convey height (Fig. 1a). 'Shape gestures' profile the C-shape spanned by the index finger and thumb to convey a round contour (Fig. 1b). We performed a series of production and perception studies to isolate the features that determine height and shape interpretations.

In a production experiment, we asked 55 participants to indicate either the height of a small ball or its shape, using only the index finger and the thumb. We found that for shape gestures, the middle, ring and little finger (fingers 3-5) were more raised than for height gestures. This suggests that for the shape interpretation, the imaginary surface spanned inside the C-shape should be unobstructed. To test this hypothesis, we asked additional 119 participants to perform the same task, but this time while holding a distractor object. Participants were more likely to remove the distractor object from the gesturing hand when performing shape gestures, indicating that they felt that the distractor object held between fingers 3-5 specifically interfered with a shape but not with a height interpretation.

To assess the role of fingers 3-5 in perception, we constructed a continuum of virtual hands that differed in the raise/curl of these fingers (see Fig. 1a and 1b for the extremes of the continuum). 309 participants indicated that they felt the virtual hand to indicate an object's height if fingers 3-5 were more curled in/less extended. In a second perception experiment, 168 participants drew an object onto a still image of the gesture. Objects were more likely aligned with the index finger and thumb (height gesture interpretation) when the fingers 3-5 were curled in (Fig 1c). Objects more often filled the entire C-shape when the fingers 3-5 were extended (Fig 1d). Together, the production and perception results show that the detailed position of particular articulators matters in determining what form a gesture conveys, and they show how small changes in the articulators can lead to large changes in gesture perception.

\* Both authors contributed to this paper equally. This work is supported in part by NSF grant #1305196 and DFG grant HA7711/1. The data is available on the authors' websites.

Keywords: gesture form



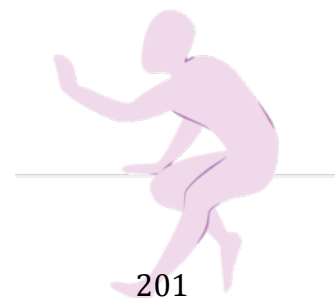
# Gesture-speech integration in time and space: a combined EEG-fMRI study

Yifei He<sup>1</sup>, Helge Gebhardt<sup>2</sup>, Miriam Steines<sup>1</sup>, Benjamin Straube<sup>1</sup>

<sup>1</sup> Philipps-University, Marburg – Germany <sup>2</sup> Justus-Liebig University Giessen – Germany

Gestures are widely used together with speech during daily communication. However, it is yet unclear how gesture and speech are autonomously integrated during online comprehension. For the past decades, neuro-cognitive studies have investigated gesture-speech integration (GSI) via different techniques. Most notably, functional imaging studies suggest that the bilateral posterior temporal sulcus/middle temporal gyrus (pSTS/MTG) and the left inferior temporal gyrus (IFG) are two important regions recruited during GSI (1, 2). Besides, recent EEG studies suggest that low frequency oscillations in the alpha and beta bands are relevant (1, 3). However, due to the inherent inadequacy of both techniques in terms of spatial and temporal resolution, a multi-dimensional understanding of the brain dynamics concerning GSI is still unavailable. In the current study, with concurrent EEG-fMRI recording and analysis, we aimed to explore how GSI is represented in the human brain from temporal, oscillatory, and anatomical perspectives in a converging picture. Specifically, we investigated intrinsically meaningful gestures (IMG) including tool-related gestures and emblems. Participants (n=20) were presented with videos of an actor either: performing IMG in the context of a German sentence (GG), IMG in the context of a Russian (as a foreign language) sentence (GR), or speaking an isolated German sentence without gesture (SG). The results of the fMRI analyses confirmed that GSI (GG > GR > SG) activates the pSTS/MTG. For the EEG analyses, we time-locked our analyses to the onset of the critical word (the word in which the meaning of gesture and speech coincides). By comparing the GG and SG condition, the GG condition elicited alpha and beta power decrease; the GG-GR comparison yielded no significant effects. With regard to EEG-informed fMRI, we found that alpha (but no beta) power negatively correlates with the BOLD signal increase in the pSTS/MTG. Moreover, we extracted single-trial alpha power from five continuous time windows of 200ms post-onset of the critical word (0-1000ms). By correlating the extracted alpha power with the BOLD responses, for the GG condition in comparison to both GR and SG conditions, we found that alpha power decrease correlates with a dynamic left fronto-temporal network, temporally spreading from the pSTS/MTG to more anterior fronto-temporal regions including the bilateral-IFG as well as the temporal pole (see Figure 1). Interestingly, this temporal progression coincides with previous literature which suggests that the pSTS/MTG is involved in a general matching between gesture and speech, whereas the left IFG is responsible for higher-level semantic processes in a second step(4). Our results not only corroborate the findings from previous literature concerning GSI in terms of EEG and fMRI, but also highlight the need for combined EEG-fMRI analyses for finer-grained future inquiries regarding the temporal- anatomical dynamics within the human brain.

Keywords: gesture speech integration, EEG, fMRI, concurrent EEG and fMRI



# Hippocampal declarative memory supports gesture production

Caitlin Hilliard, Melissa Duff, Susan Cook

University of Iowa – United States

The spontaneous hand gestures that accompany spoken language affect communication, learning, and memory. Nonetheless, the cognitive and neural mechanisms underlying gesture production remain unknown. Many theories that address how gesture production occurs focus on the underlying representation in the mind from which gestures stem (Hostetter & Alibali, 2008; McNeill, 1992), typically focusing on visual, spatial, or motor information represented in gesture. We have taken a similar, but orthogonal approach, by considering how the underlying representation is encoded in memory. Memory is separated into two functionally and anatomically distinct systems: declarative and non-declarative memory. We hypothesized that because gesture comes along with declarative information in speech, that is known to be hippocampally mediated, gesture production might be supported by hippocampus.

We examined the speech and gesture of patients with hippocampal amnesia and healthy comparison participants. Patients with bilateral hippocampal damage are impaired at forming new declarative memories as well as at reconstructing memories from their past. Examining the communication of these patients thus provides the opportunity to examine whether degraded hippocampal memory representations influence online gesture and speech production.

All participants engaged in four discourse tasks in which they talked about past personal experiences (their most frightening experience) and habitual events (sandwich making). We calculated gesture rate (gestures/word) and also coded spoken words for standard measures that have been shown to correlate with gesture production in previous studies including frequency, familiarity, imageability, and length. We analyzed data using mixed effects models with a fixed effect of patient status and random intercepts for task and participant. Despite producing the same amount of speech as comparison participants, patients with hippocampal amnesia gestured less than healthy comparisons ( $B=0.56, t=2.41, p=.03$ ) across all tasks. Patients also produced words that were more frequent ( $B=-0.13, t=-1.82, p=.08$ ), more familiar ( $B=.004, t=2.05, p=.05$ ), and fewer letters ( $B=0.05, t=2.85, p=.01$ ) than those of comparisons. Interestingly, the difference between patients and controls was greater in both speech and gesture when communicating about past personal experiences compared with habitual events.

Although amnesic patients spoke the same amount as comparison participants, the richness of their communication was impoverished in both gesture and speech. They produced fewer gestures and used more frequent and familiar words. This suggests that the declarative memory representation underlying communication is critical in how information is translated into gesture and speech. Additionally, patients produced less gesture when discussing topics that required reconstruction of an event relative to description of a habitual action. Description of a habitual action may rely less on declarative memory. Since patients' representation in declarative memory is impoverished, fewer details of the representation are depicted in gesture for tasks that rely more on declarative memory. Activation of rich mental representations via the hippocampus is one of many possible mechanisms of gesture production.

Keywords: gesture production, memory, hippocampus, memory systems



# Semantic motivations for cyclic gestures used for marking discourse coherence in interaction

Laura Hirrel

University of New Mexico (UNM) – Department of Linguistics MSC03 2130 1 University of New Mexico Albuquerque, NM 87131, United States

Gesture families are groupings of gestures that share at least one articulatory feature (e.g., handshape, movement, palm orientation) and are assumed to share general semantic properties (Kendon, 2004, p. 227). In this study, I explore functions associated with cyclic gestures, which have been described as a type of gesture family. Cyclic gestures are those displaying a "continuous circular movement of the hand" that have been shown to serve diverse functions in interaction, such as functions related to word searches, the performance of certain speech acts, or reference to mental processes (Ladewig, 2011). In examining the forms and uses of Palm- Up-Open-Hand gestures (PUOH), Müller (2004) found that a circular movement co-occurring with a PUOH gesture can contribute a meaning of continuity across arguments a speaker makes in discourse. Cyclic gestures that function to bring coherence to the structuring of information in interaction, such as those Müller observed, have not been closely examined and described in the literature.

As part of a larger ongoing study that examines functions associated with cyclic gesture use in English talk shows, I have found that cyclic gestures frequently align temporally with spoken language constructions that are known to encode various types of semantic relationships across events in discourse. Examples (1-3) show English constructions that are conventionally used to indicate semantic coherency across events and with which cyclic gestures were found to co-occur in the data. Note: cyclic gesture strokes correspond to the bolded, underlined units.

(1) I mean they saw us but they were just like focused on the game

(adversative clausal coordination)

(2) you have to like make sure you do it exactly five seconds otherwise it's not gonna work

(disjunctive clausal coordination)

(3) first they start you off on tires that they yank with rope and that kind of the rudimentary stuff

(relative clause)

In this current research, I performed fine-grained functional-semantic analysis on spoken language constructions that co-occurred with cyclic gestures in the data, specifically those constructions known to encode semantic relationships across events expressed in the discourse. Through this analysis, I identified several factors related to the construal of the relationship across events that, I suggest, motivate the use of cyclic gestures with these spoken language constructions. I further show how cyclic gestures interact with these various construals to serve the more general interactional function of elaboration. Finally, I propose historical sources for these related discourse structuring functions of cyclic gesture based upon the occurrence of cyclics in other types of constructions in the data that are known to be diachronically related in spoken languages. This work contributes to the growing body of research exploring the multimodal construction of meaning in interaction.

Keywords: co, speech gestures, multimodal constructions, discourse analysis, cognitive linguistics





# Drinking for speaking: The multimodal organization of drinking in conversation

Elliott Hoe

Max Planck Institute for Psycholinguistics – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands

Many conversations are accompanied by drinking. Physiological constraints, however, largely preclude drinking and speaking concurrently. Conversationists must therefore coordinate drinking with speaking. In this paper, I build on prior research investigating the coordination of talk and bodily action (Goodwin, 1979; Laurier, 2008; Mondada, 2009; Haddington et al., 2014) by analyzing the placement of drinking in talk-in-interaction. Specifically I examine when participants lift their drinks. This action reveals participants' analyses of the current participation framework (Goodwin and Goodwin, 2004) by rendering the present moment as 'a moment where I don't speak'. The data are 152 such instances collected from video-recorded natural interactions in English, analyzed using multimodal conversation analysis (Sidnell and Stivers, 2013).

Taking a drink does not occur randomly, but at particular places in the course of interaction. Participants regularly drink during multi-unit turns, in sequence closure environments, during lapses, after jokes, and at possible turn-completion, as in the exchange below. Here, Lex is speculating that the free cable television in her apartment has something to do with the previous tenants.

LEX: I think maybe cuz the people befo:re us<sub>2</sub> Id\*unno <sup>o</sup>but.<sup>o</sup> \*lifts drink-> > RAC: [Oh that's good.

MAR: [That'd be awesome.

Lex's turn approaches possible completion at "us", and she increments it with turn-exiting "Idunno but" while lifting her drink. This visible conduct is part of a multimodal package; drinking signals non-continuation by marking possible turn-completion as actual turn-completion. And indeed, her two co-participants treat it as turn-exiting by responding in overlap. This drinking-for-turn-exiting device can also be used strategically. Below, three friends are reentering conversation after the researcher set up the video camera and prompted them to continue conversing.

(1.8) ROW: .mtsk \*£So Matt.£

\*lifts drink, gazing at Matt-> MAT: £Let's not re- Better not s\*ay anything ba:d£ row -> \*drinks-> >

Rowan restarts their conversation with "So Matt" while gazing to Matt and lifting his drink. The turn-initial "So" (Bolden, 2006) and the turn-final address term (Lerner, 2003) position Matt as 'someone relevant for upcoming talk'. By drinking here, Rowan shows that he will not continue, thereby visibly avoiding having to explain why Matt might be 'relevant for upcoming talk'. Matt shares in this understanding, as he treats Rowan's prompt as a provocation: he warns Rowan not to bring up any untoward topics while being video-recorded. Drinking can thus do more than turn-exiting-here it serves to embed a joke in a prompt.

This paper demonstrates how participants skillfully weave into the fabric of interaction the simple act of drinking. It shows that drinks are not just material artifacts accompanying social occasions, but constitutive components of interactional settings that participants can use in the achievement of practical actions.

Keywords: conversation analysis, participation, interaction



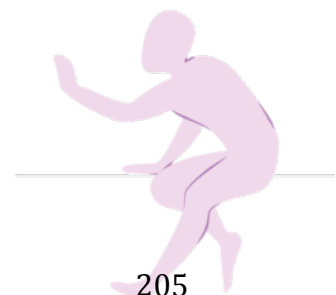
# Turn-timing and the body: Gesture speeds up conversation

Judith Holler, Kobin Kendrick

<sup>1</sup> Max Planck Institute for Psycholinguistics (MPI for Psycholinguistics) – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands

Conversation is the core niche of human multi-modal language use and it is characterized by a system of taking turns. This organization poses a particular psycholinguistic challenge for its participants: considering the gap between two speaking turns averages around just 200 ms (Stivers et al., 2009) but the production of single word utterances takes a minimum of 600 ms alone (Indefrey & Levelt, 2004), language production and comprehension must largely run in parallel; while listening to an on-going turn, a next speaker has to predict the upcoming content and end of that turn to start preparing their own and launch it on time (Levinson, 2013). Recently, research has begun to investigate the cognitive processes underpinning turn-taking (see Holler et al., 2015 for an overview), but this research has focused on the spoken modality. The present study investigates the role co-speech gestures may play in this process. We analysed a corpus of 7 casual face-to-face conversations between English speakers for all question-response sequences (N=281), the gestures that accompanied the identified set of questions, and the timing of these gestures with respect to the speaking turns they accompanied. Moreover, we measured the length of all inter-turn gaps in our set. Our main research question was whether the length of the gap between turns varied systematically as a consequence of questions being accompanied by gesture. Our results revealed that this is indeed the case: Questions with a gestural component were responded to significantly faster than questions without a gestural component. This finding holds when we consider head and hand gestures separately, when we control for points of possible completion in the verbal utterance prior to turn end, and when we control for complexity associated with question type. Furthermore, our findings revealed that within the group of questions accompanied by gestures, those questions whose gestures retracted prior to turn end were responded to faster than questions whose gestures retracted following turn end. This study provides evidence that gestures accompanying spoken questions in conversation facilitate the coordination of turns. While experimental studies have demonstrated beneficial effects of gestures on language processing, this is the first evidence that gestures may benefit processing even in the rich, cognitively challenging context of conversational interaction. That is, gestures appear to play an important psycholinguistic function during immersed, in situ language processing. Experimental work is currently exploring at which level (semantic, pragmatic, perceptual) the facilitative effects we found are operating. The findings not only suggest psycholinguistic processing benefits but also expand on previous turn-taking models that restrict the function of gesture to turn-yielding/-keeping cues (Duncan, 1972) as well as on turn-taking models focusing primarily on the verbal modality (Sacks et al., 1974).

Keywords: gesture, turn, taking, social interaction, conversation, timing, coordination, dialogue



# Extended gestures to manage the rule of the game interactively

Hiromichi Hosoma

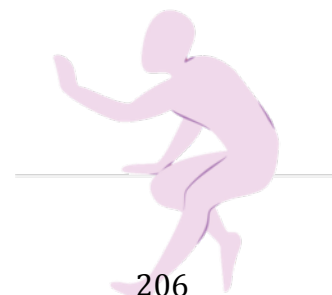
University of Shiga Prefecture – Hassaka, Hikone, Shiga, 522-8533 Japan, Japan

In interactive games, the players often skip to confirm whole of the rules at the start and take the "Let's just play and see" attitude to define the detail of the rules while they playing (Lieberman 2013). In this presentation, we show how the gestures can be extended beyond the utterance (xxxx 2009), interact with gestures and speech of the others, and contribute to define the detail of the rules in the card game. For analyzing the typical process of the rule organization, we observed the card game "baba-nuki" (Japanese version of "Old Maid"). The rule of the card game "baba-nuki" is the almost same as the one of "Old maid": the player X offers his/her hand to the next player Y, and Y selects a card from X's hand to find any pair with Y's hand to discard. Although the rule seems to be simple enough to understand even for children, adults can lose the rule when the game starts.

We observed and analyzed the process of 4 players' baba-nuki in 11 groups to analyze the interactive process at the start point of the game. In our data, most parties discussed about 3 aspects of the rule: which direction (clockwise or counterclockwise) the game to be progressed, with which player (left or right of the focal player) to interact, and which role (offering or selecting the card) the focal player should play. Baba-nuki has the ambiguity of the rule in these 3 aspects in the initial phase of the game, which cause discussions with gesture and speech among the players.

In these discussion process, the players expressed their interpretations each other for each case, not only with their utterances but also with their body movements: the slight change of the posture, gaze shifts, and the hand movements on cards, which sometimes projected the actions opposite to the utterance (e.g. the utterance said "You can do either way" but the body movements on cards showed "You draw"). Multimodal analysis showed that the timing of the gesture were often extended beyond the utterance, and that the players used the time structure of the gesture phases to show which movement should be selected to define the rule. Focusing on the case in which the gestures are extended beyond the utterance, we show how the time structure of gesture strokes and holds can be extended to interact with other speech and gesture. We also discuss how the defined rule can be succeeded in the following sequence of the game with gestures along the others' utterance.

Keywords: rules in game, conversation analysis, ethnomethodology, extended gesture



# Filling a research gap – Multimodal constructions in preschool children

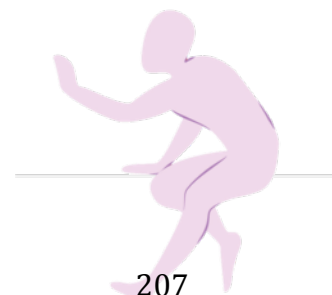
Lena Hotze

European University Viadrina (EUV) – Große Scharrnstrasse 59 15230 Frankfurt (Oder), Germany

The use of gestures in early infantile communication has been well investigated from a language-acquisition perspective (e.g., Morgenstern 2014 or Iverson and Goldin-Meadow 2005). However, in the majority of cases, children under the age of four are studied. This is remarkable because from the age of three onwards children more and more develop an adult-like speech- gesture system with different gesture types, for instance discursive and performative. Among others, Behrens (2008) has pointed out this research gap by emphasizing that 1) only few corpora provide data from children aged four or older and 2) that there is only very little information about children's naturalistic linguistic interaction and production in the (pre-)school years. This paper takes up Behren's observations and focuses on kindergarten children in everyday interactions. Following Andr'en's findings (2010: 258) that children show multimodal flexible constructions, i.e. recurrent combinations of words and gestures that become more stabilized and restricted the older a child becomes, this study investigates children's word-gesture combinations at the age of 4 to 6. The study is based on six hours of video data in which German speaking kindergarten children were filmed in different situations of everyday interactions (e.g., playing, doing handicrafts, or eating). Taking a linguistic perspective on the study of gestures (Ladewig 2014; Müller et al. 2013, 2014; Payrat'ó and Teßendorf 2014), all instances of word-gesture combinations were identified and analyzed with respect to their form, meaning, and function. It will be shown that kindergarten children use multimodal constructions of particularly conventionalized gestures such as deictic and performative gestures and a restricted set of words and clauses. In addition, it will be illustrated a full range of gesture types and their communicative functions, which were used in conversations between preschool child and preschool child as well as between child care worker and kindergarten child.

The study offers a starting point for empirical observations of gesture-word productions between the ages of 4 and 6. It aims at giving insights into how multimodal constructions shift over time and thus provides an insight into the change from infantile to adult speech-gesture system.

Keywords: multimodal construction, kindergarten children, preschool children, speech gesture system



# Iconicity in multimodal gestures: Evidence from master classes on conducting

Hui-Chieh Hsu, Benjamin Anible, Corrine Occhino-Kehoe

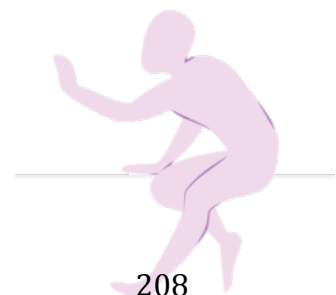
University of New Mexico (UNM) – United States

Rehearsing an orchestra is essentially multimodal, in that the conductor often draws upon numerous means of communication, such as vocal and manual gestures, eye gaze, body posture, etc. One of the traits that differentiate conducting from most other means of communication involving speech is that the conductor frequently makes use of vocal mimicry in order to facilitate communication. We define vocal mimicry as vocal gestures which encode non-linguistic auditory stimuli, such as melody, percussive rhythm patterns, and ambient noise. Also peculiar to conducting is the extensive use of manual gestures, which during performance is the conductor's principal way of communication. Long considered "non-linguistic," attention to vocal mimicry is long overdue particularly in relation to manual gesture, which often accompanies vocal mimicry in conducting. In light of these complex multimodal constructions frequently utilized by conductors, we examine these two peculiarities of orchestral conducting from a Cognitive Linguistic perspective.

Video recordings of conducting master classes were collected from YouTube and coded using ELAN. The manual gestures were categorized following Cienki (2005), in which referential gestures are categorized as OBJECT (e.g. "a picture frame") or ACTION (e.g. "the rolling of a tire"). These categorizations were then mapped onto the tokens of vocal mimicry, which were categorized with respect to telicity. Adapted from Anible (2014), this phono-semantic distinction maps vocal gestures with an obstruent onset to TELIC, and those with a sonorant onset to ATELIC.

Results show significant correlation between the meaning of the conductor's mimicked vocal gesture and the accompanying manual gesture [ $\chi^2(1, N=28)=11.81, p<.005$ ]: TELIC mimicries tend to be accompanied by OBJECT manual gestures, whereas ATELIC mimicries are accompanied ACTION manual gestures. This demonstrates cross-modal iconicity between the functions of the conductor's vocal and manual gestures. Equally intriguing is the observation that not all of the multimodal constructions coded were complementary. That is, a small portion of TELIC mimicries were accompanied by ACTION manual gestures, while some ATELIC mimicries were accompanied by OBJECT manual gestures. We argue that in these cases manual gesture and vocal mimicry each provides information not present in the other modality, supporting the view that meanings communicated through different modes are able to complement each other, a phenomenon widely observed between speech and gesture (e.g. McNeil 1992). The present study suggests that multimodal constructions used by conductors are not unlike those used in everyday conversations. In the same way that the speaker is able to take advantage of the complimentary and augmentative feature of multimodal constructions, the conductor exploits this characteristic of multimodal communication to convey artistic ideas to the orchestra with more precision.

Keywords: vocal mimicry, manual gesture, orchestral conducting, multimodality, iconicity



# Preschoolers benefit from beat gestures when recalling information

Alfonso Igualada<sup>1</sup>, Nu'ria Esteve-Gibert, Pilar Prieto<sup>1,2</sup>

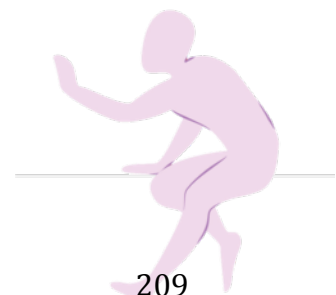
<sup>1</sup> Universitat Pompeu Fabra (UPF) – Roc Boronat 08013 Barcelona, Spain <sup>2</sup> Institució Catalana de Recerca i Estudis Avançats [Barcelona] (ICREA) – Passeig Lluís Companys, 23 08010 Barcelona - Espanya, Spain

In conversation speakers accompany speech with hand and body motions that are typically aligned with prosodic heads and edges (Loehr, 2012). These beat gestures have been shown to be strongly correlated in speech with the presence of acoustic cues of prominence (Krahmer & Swerts, 2007) and to have similar functions as prosody, e.g. information highlighting (Loehr, 2012; Wagner, 2014). Moreover, the presence of beat (and iconic) gestures has been found to help adults to recall information (So, Chen-Hui & Wei-Shan, 2012). With respect to acquisition, previous studies have found that gestures expressing representational information, such as iconic gestures, are related to the early acquisition of language and cognitive abilities (Iverson & Goldin-Meadow, 2005; Goldin-Meadow, Cook & Mitchell, 2009; Tellier, 2008). However, less is known about whether beat gestures also interplay with early cognitive abilities. So et al. (2012) found that while adults benefited from the presence of both iconic and beat gestures to recall words, 5-year-old children only benefited from the presence of iconic gestures. In their study, however, every word of the list was presented with a beat gesture, and thus children could not perceive beat gestures as a prominent cue in contrast to a less prominent cue. Moreover, the list of words was presented without a pragmatic context, and serial sequential effects were not controlled for.

The aim of our study is to investigate whether the presence of beat gestures helps children to recall a word when they are presented a prominent cue in a relevant discourse. One-hundred and four 3-, 4-, and 5-year old children participated in our study. They were presented with a story about an elephant that enjoys travelling and were asked to recall a list of target items that the character had to perform before travelling. Each trial consisted of a list of five different disyllabic nouns, presented in two different conditions (2 trials per condition, within-subjects): a 'no-beat condition', and a 'beat condition'. In order to control for serial sequential effects, the beat/no-beat exposure only affected the middle item in the lists.

The results show that infants recall significantly better the target item in the beat condition than in the no-beat condition,  $F(1, 410) = 4.682$ ,  $p < .05$  (See Fig 1). Post-hoc values on the interaction between age and condition show a better ability to recall in the beat condition ( $F(2, 410) = 3.810$ ,  $p < .05$ ) at 5-year-old than at 3-year-old. Beat gestures help children to recall information when they function as a prominent cue in a discourse context. This ability seems to be fully acquired around 5-year-old. This study shows evidence on the children's ability to rely on beat gestures in a word recall task.

Keywords: Beat gestures, Word recall, Preschoolers





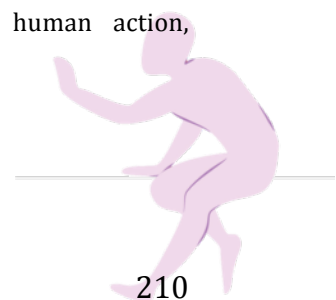
# Deconstructing the embodied knowledge of city arborists through choreography and co-operative transformation zones

Matthew Ingram

Department of Communication Studies, Austin Texas (University of Texas at Austin) – CMA 7.112 2504A  
Whitis Ave., Austin, TX 78712-0115, United States

Research on embodied interaction has long been concerned with the ways in which bodily conduct becomes habitualized in the course of everyday social life. Scholars from a variety of aligned disciplines (anthropology, cognitive science, interaction studies, literary studies, performance studies, among others) have continuously developed terminologies in order to understand how individual and community bodies become acculturated into culturally specific sets of corporeal practices (Noland, 2009); practices that orient individuals to certain ways of engaging in the material and social world. In terms of more interactional-based accounts of embodiment, C. Goodwin's (1994) work on embodiment in mundane social and professional settings (e.g., courtrooms, geological field sites, and airport traffic control towers) suggests that individuals are socialized into what he terms professional vision, that is, the perceptual schemata of embodied practices that guide professional workers to see the world through a community-specific skilled logic. It is through this embodied knowledge that individual professional communities come to visually understand, interpret, and use a professional field site and the tools that are available within it (Goodwin, 2012). Given this understanding, what happens in the course of an intercultural exchange between two professional communities who do not share a common (bodily) understanding (Clark & Brennan, 1991) of each other's work? To investigate this question, we turn our attention to interactions between a professional community of choreographers and another of city arborists, as the two communities work together to create a collaborative dance performance. This paper presents observations on how the choreographers creatively engage in ethnographic and participatory methods in order to understand the skilled movements of the arborists. By investigating the arborists' daily actions, the choreographers are able to cast the same professionals as performers in a large-scale theatrical performance that showcases the significance the arborist's skilled enactments. I argue that the choreographers and arborists engage in what Goodwin (2012) refers to as co-operative transformation zones, that is, operative spaces for participants to decompose, reuse, and layer forms of social action to co-operatively accomplish the project at hand. Through video-based data examples, we argue that the choreographers and arborists engage in a variety of gestural actions to make publically available the arborists' embodied knowledge (Goodwin, 2011; Streeck, 2011) which can then be deconstructed and transformed for the purposes of creating an aesthetically pleasing dance routine. By building a publically available common ground, the choreographers are able to creatively transform bodily actions (Streeck, 2009) and the professional vision of the arborists in order to transform it into an empowering theatrical performance. For instance, in the course of creating a dance routine using chain-saw movements, the choreographers abstract, decompose, and reuse specialized cutting motions of the workers and rebuild them in an artistic context.

Keywords: co, operative transformation zone, embodied knowledge, multimodality, human action, professional vision



# Sensitivity to discourse-pragmatic principles: Use of speech and gesture to indicate referents in children with autism spectrum disorders in middle childhood

Kit-Yee Mavis Ip, Ka-Yee Carrie Lam, Him-Yau Hannah Chan, Ching Ginny Wong, Tsz Lok Lee

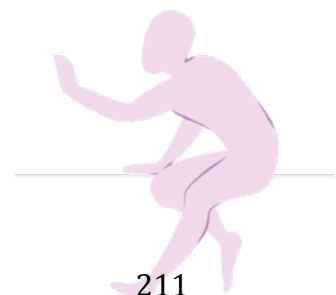
The Chinese University of Hong Kong – Hong Kong SAR China

Young children learning different languages have already acquired discourse principles. They use more specified lexical forms (nouns) for newly mentioned referents and less specified lexical forms (pronouns, null arguments) for previously mentioned referents (e.g., Allen, 2000; Serratrice, 2005). When children talk, they gesture. Previous findings have also shown that the gestures produced by young children follow the discourse principle (So, et al., 2009). They gesture new referents more often than given referents. However, very little is known about whether children with Autism Spectrum Disorders (ASD) gesture similarly to their aged-matched typically-developing (TD) peers in a discourse. Previous research has shown that young children with ASD have delayed gestural development, in comparison to TD children (e.g., Charman, et al., 2003). Two recent studies showed that gesture deficit is still found among school-aged children with ASD (So, et al., 2015a; 2015b). These children gesture less often and have difficulties in integrating speech with gestures. We examined here whether gestures produced by children with low-functioning ASD (LASD; IQs < 70; N=10) and those with high-functioning ASD (HASD; IQs ≥ 70; N=10) followed discourse principles, in comparison to those produced by TD children (N=10). Children with LASD had lower IQs and language proficiency than the other two groups.

Caregivers and six-to-twelve-year-old children engaged in spontaneous interactions for 15 minutes. We classified all third-person referents produced by the children into different lexical forms (i.e., noun, pronoun, and null argument) and further categorized them into given and new referents. All three groups of children produced greater proportions of more specified lexical forms when indicating new referents and less specified forms for given referents,  $F(2,54)=61.56$ ,  $p<.001$ ,  $h^2=.695$ . Thus, the speech produced by children with HASD and those with LASD was sensitive to the discourse principle. In terms of gestures, there was a marginally significant three-way (group x lexical form x status) interaction,  $F(4,54)=2.18$ ,  $p=.084$ ,  $h^2=.139$  (Fig.1). Specifically, both TD and children with HASD produced greater proportions of gestures to indicate new referents than given referents, which were expressed in all three kinds of lexical forms. However, children with LASD gestured new referents more often than given referents in nouns and pronouns only but not in null arguments. Children with LASD also produced significantly smaller proportion of gestures for new referents expressed in null arguments, compared to children with HASD,  $p<.063$ , and TD children,  $p<.005$ . Thus, children with LASD did not differentiate new and given referents in their gestures when those referents were not lexically specified, suggesting that they have not fully mastered the discourse principle.

Overall, school-aged children with ASD gestured similarly to TD children. However, there was some delay in gesture use at discourse in children with LASD, probably due to lower intelligence and language proficiency.

Keywords: Gesture, Discourse, Autism Spectrum Disorders



# Speech, Gesture and Argumentation. On the Role of Some Grasping Gestures

Jérôme Jacquin

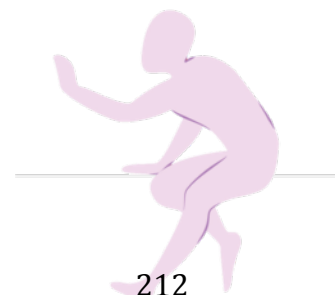
Université de Lausanne (UNIL) – 1015 Lausanne, Switzerland

The relationship between speech and gestures in argumentation is still largely unknown. Drawing on a descriptive/language oriented approach to argumentation (e.g. Doury, 1997; Jacquin, 2014; Jacquin & Micheli, 2012; Micheli, 2010; Plantin, 1996, 2005), this paper will explore the potential argumentative orientation of two variants of grasping gestures: (a) The "(upside-down) bowl" (Calbris, 2003, 2011), where "the [facing downwards] spread-out fingers of one hand encircle [an] abstract entity" (Calbris, 2011, p. 313, see attached Figure 1); (b) The "finger bunch", "grappolo" (Kendon, 1995, 2004) or "pyramid" (Calbris, 2003, 2011), which, when pointing upwards, "becomes a manual purse that is able to contain an object captured in the palm" (Calbris, 2011, p. 90), "a 'particular' or 'condensed' object 'enclosed' inside the hand" (ibid., p. 331, "precision grip" in Kendon, 2004; see attached Figure 2).

Both variants are expressions of the same action, representing "an object to be grasped" (Calbris, 2011, p. 107). However, since no physical objects are actually grasped, such gestures can be considered metaphorical (e.g. Cienki & Müller, 2008). This interpretation concerns both the object that is grasped and the process of grasping. While the object to be grasped could be linked to the "topic" or "discourse object" that is emphasized in the talk (e.g. Berthoud, 1996; Grobet, 2002; Mondada, 1994), the metaphorical process of grasping such an object in an argumentative situation could be oriented towards two argumentation schemes that have been well identified by Informal Logic (e.g. Walton, Reed, & Macagno, 2008): (a) the argument from example (i.e. the arguer introduces the grasped object as an example that supports the standpoint) and (b) the argument from definition (i.e. the arguer defines the grasped object in such a way that the definition acts as support for the standpoint).

In other words, the hypothesis drawn by this paper is that metaphorical grasping gestures performed in an argumentative situation are oriented towards either the argument from definition or the argument from example. The goal is to examine the situated coordination between speech and gestures in order to better understand of the function of the grasping gestures in the argumentative sequences where they emerge, possibly leading to the identification of argumentative "multimodal Gestalts" (e.g. Mondada, 2012). The paper will be based on various French and English video-recorded data collections, documenting institutional interactions (public and televised debates, management and work meetings).

Keywords: Grasping gestures, metaphor, topic, argument from definition, argument from example



# Improvising with a virtual agent using gestures: the role of imitation, self-attention and expressivity

Jean-François Jégo, Dimitrios Batras, Judith Guez, Chu-Yin Chen, Marie-Helene Tramus

Université Paris 8, Vincennes-Saint-Denis (UP8) – Université Paris VIII - Vincennes Saint-Denis, Université Paris VIII Vincennes-Saint Denis – 2 rue de la Liberté - 93526 Saint-Denis cedex, France

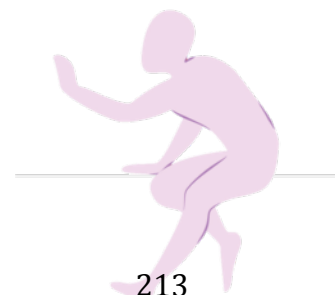
We propose to explore the elements that make the virtual actor able to interact plausibly regarding how actors embody and reenact gestures during improvisation sessions. Based on the Enaction theory [1], we expect the agent to maintain a dialogue where the real actor accepts the digital one and gets inspired by it. The Enactive process needs the experience to be renewed all the time by the sensorimotor action-perception loop. In this research, we describe from the hypotheses to the results the process of designing a virtual agent aware of its movements and its ability to improvise with an actor.

Several experiments of improvisation conducted with actors through computer-mediated interactions help us in characterizing specific dynamics of gestures, recurrent behaviors and gestural patterns. Experiments were filmed, then the actors were interviewed in first person following the "explicitation interview" process [2][3]. Results were analyzed by linguists and computer scientists. First, the capacity of self-attention of the actors while improvising is noticed. Driven by this observation, we decide to provide the agent the ability to perceive its own arms movements. Comparing its movements to the ones of the actor in real-time is a way to estimate a form of synchronicity. Since we focus on gestural interaction with arms only, it was impossible for the participants to see their gaze nor their facial expressions during these experiments. Therefore, we note they use imitation as a way to indicate to each other's they communicate. Regarding the oscillation of the whole body of both actors we observe they express in a similar rhythm regardless of the meaning of the gestural form.

To model the action-perception loop, we extract specific descriptors of movement such as hands velocity, acceleration, head orientation and the relative position of both hands to the sagittal plane. We isolate four principal behaviors: idle, imitation, expressive and artificially-generated gesture. An agent system is developed based on these observations. It perceives and interprets the activity of both real and virtual actors in terms of the previously mentioned descriptors. The proper combination of them triggers a transition from one behavior to another based on an encoded set of rules, in accordance with the principals of FSM theory [4].

An artistic interactive installation was created using the agent system and experimented by the participants. We observe they were able to improvise with the agent fluently for a period of time without interruption. It appears they became aware of the capabilities of the agent and adapted their behavior. We are conducting analysis using gesture annotation in Elan: first results show that not only they adapt to the (re)actions of the agent but also they

Keywords: gesture recognition, NEUROGES, coding systems, annotation, reliability



# The Role of Gesture in Syntactic Ambiguity: Negation and Quantification in English

Masaaki Kamiya<sup>1</sup>, Amanda Brown<sup>2</sup>

<sup>1</sup> Hamilton College – United States <sup>2</sup> Syracuse University (Linguistics) – HBC 340, Syracuse University, Syracuse NY 13244, United States

Gestures are associated with spoken expression of negation, with research on Open Hand Prone gestures (Kendon, 2004), head shakes (e.g. Kendon, 2002; Calbris, 2011), and their interaction and synchronization (Harrison, 2014). The current study examines a context of negation in English in which the presence of quantification yields scopal ambiguities, and asks to what extent gestural forms and timings help speakers convey intended interpretations.

In a quasi-experimental design, 25 native speakers of English were familiarized with syntactically ambiguous sentences embedded in disambiguating contexts, and subsequently produced the syntactically ambiguous sentences as expressively as possible, purportedly for the purposes of a language comprehension test, while being video recorded. Analyses focused on five sentences incorporating quantifiers (all in subject position; many/most in object position) and verbal negation, for which one of two interpretations were each possible. Examples are shown in (1) and (2) (Syrett et al., 2014).

(1) All the magnolias won't bloom.

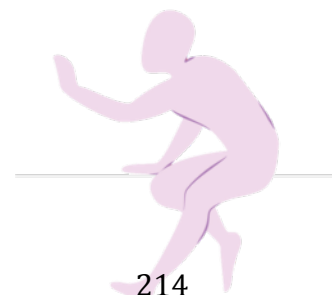
(2) Liam doesn't know many alumni.

In (1), the negator not may take scope over the quantifier all, yielding partial 'not all' negation. In the alternative interpretation, the quantifier all takes scope over the negator not, yielding total 'all not' negation. In (2), while the quantity itself does not change, when the negator not takes scope over the quantifier many, the focus is positive, highlighting that some alumni are known, but when the quantifier many takes scope over the negator not, the focus is negative, highlighting the number of alumni that are not known.

Analyses of 293 gestures focused on the gesture articulator, form, length, and alignment. The majority of gestures in all target contexts were found to be head gestures. Further, repeated measures analyses revealed that significantly more head shakes than other head gestures were observed in negative many/most contexts. In addition, gestures accompanying contexts in which the quantifier takes scope over negation (total negation and negative focus), gestures were significantly longer, spanning more lexical items than in contexts where negation takes scope over the quantifier.

Results will be discussed with reference to scope of negation as reflected in gesture (see Harrison, 2010, 2013, 2014). Moreover, the communicative contribution of gesture will be evaluated in the context of mixed results regarding the robustness of prosodic signatures in scopally ambiguous sentences involving quantification and negation in English (e.g. Syrett et al. 2014).

Keywords: negation, quantification, syntactic ambiguity, co, speech gesture



# Gestures in play: A window on the world of Murrinhpatha-learning children

Barbara Kelly, William Forshaw, Lucinda Davidson

University of Melbourne – Australia

Children's play provides a window into how they view their world and make sense of events. When children engage in spontaneous play they develop creativity of bodily expression through words and actions. These actions often include conventional gestures conveying socio-culturally agreed upon meanings with relatively fixed gesture forms (e.g., a rapid head nod to indicate an affirmative) as well as less conventional gestures. This paper examines creativity of manual gestures in the spontaneous play of children acquiring Murrinhpatha, an Indigenous language of northern Australia. While studies have investigated children's pointing (Wilkins 2003) and adult gesture and sign (Green 2014) in Arrente, an Indigenous Australian language, the study reported here is the first investigation of a range of gestures in children's play in Indigenous Australia.

The study addresses the following research questions (RQs):

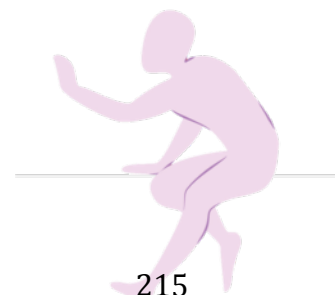
1. What conventional manual gestures are evident in Murrinhpatha-learning children's spontaneous play?
2. What non-conventional manual gestures are evident in children's play?

Data comes from forty hours of child-carer interaction. Six primary carers and six children across different ages (2;3–4;0) were recorded across multiple time points of 30-60 minutes at around 4-month intervals over 3 years. Conventional gestures are those used across the community and identified as meaningful by adults. Non-conventional gestures are all other gestures.

Findings for the study indicate that manual gestures have an important role in children's Murrinhpatha communications. Results for RQ(1) indicate that by 4;0 years the following conventional gestures were used by the Murrinhpatha-learning children in the study: deictic (pointing at an object to draw attention to it or to request it, using an extended index finger or hand; question (closed hand supine - palm up facing child - with thumb and fifth finger extended to mark an interrogative); absence (two open hands raised palm up or angled palm), greeting (hand wave in greeting and leave-taking); gangsta: gang-culture-based gestures such as arms across the body, crossed at the elbows with hands in question position but prone - facing away from the child. Results for RQ(2) show a range of non-conventional manual gestures that have meaning in the children's play and sometimes occurred across multiple play events and children. These include arm raised and hand spinning to indicate celebration, patting absent pockets and raising hands palm up to indicate no money, holding up a supine hand with fingers splayed to indicate playing cards. The children moved seamlessly between conventional and non-conventional gestures in their play and in their daily interactions.

As with children in many other cultures, Murrinhpatha children's gestures, extend beyond the manual modality, but even this subset of gestures, particularly the non-conventional uses, can elucidate their perspectives on the world and the range of meanings children are able to depict through gesture.

Keywords: children, acquisition, play, Indigenous Australia





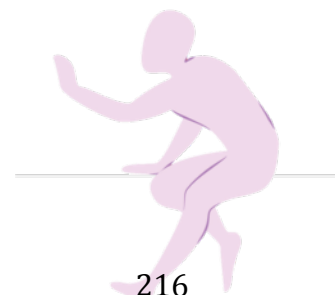
# Perceiving the dance of a different culture: Gestural responses of Germans and Koreans to Ballet and Korean Dance

Zi Hyun Kim, Hedda Lausberg

Department of Neurology, Psychosomatic Medicine, and Psychiatry, Institute of health promotion and clinical movement science, German Sport University Cologne – Am Sportpark Müngersdorf 6, 50933 Cologne, Germany

Artistic dance differs between cultures concerning the formal movement repertoire. The dance form per se reflects concepts of the respective culture including those about emotions. However, thus far cross-cultural differences in the perception of dance have rarely been addressed. Therefore, the present study explores the perception of culture-specific dance performances of emotions in spectators of the same and different cultures by investigating their gestural depictions as a direct reflection of the perception of the dance movements. German (16 female, 14 male) and Korean participants (14 female, 16 male) described their thoughts and feelings about four dance scenes showing (i) a happy scene of the ballet Giselle, (ii) a sad scene of Giselle, (iii) a happy scene of Korean dance Sung-Mu, and (iv) a sad scene of Sung-Mu. The participants' descriptions were videotaped and their accompanying hand movements and gestures were analyzed by two independent certified raters with the NEUROGES coding system. When describing their impressions about Sung-Mu versus Giselle, the Korean participants performed significantly more phasic in space movements (functionally gestures), specifically pointing, while the Germans displayed more emphasis gestures. Furthermore, the hand movement and gestural behavior of the two groups differed significantly in several parameters regarding the emotional valence of the dance scene. The gestural responses of Koreans and Germans to the cultural dance form, independent of the emotional valence, suggested in-group effects in the perception of the dance. However, the emotional valence, notably sadness, appeared to overrun this effect and to be decodable across cultures.

Keywords: perception, emotion, dance, culture, gesture, hand movement



# Word order universals reflect cognitive biases: evidence from silent gesture

Simon Kirby, Jennifer Culbertson, Marieke Schouwstra

Language Evolution and Computation Research Unit, School of Philosophy, Psychology and Language Sciences, University of Edinburgh – United Kingdom

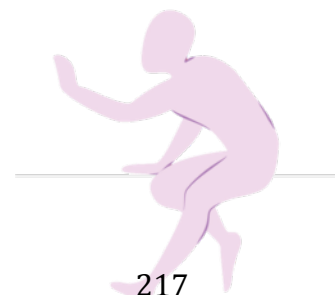
Research in linguistic typology has identified many cases in which particular patterns appear to be over- or under-represented in the world's languages. The extent to which these so-called typological universals reflect universal properties of human cognition remains heavily debated. In this paper, we provide empirical evidence connecting universals of word order to cognitive biases using a silent gesture experiment. The silent gesture paradigm allows us to capture spontaneous, untrained responses in a modality distinct from participants' previous language experience (Goldin-Meadow, So, Ozyurek, & Mylander, 2008). Our starting hypothesis comes from Greenberg's Universal 20 (Greenberg, 1963), concerning how adjective, numeral, demonstrative and noun are ordered. The distribution of possible orders of these elements is heavily skewed and it has been proposed that the common orders are those which match up transparently with the underlying semantics (Abels & Neeleman, 2012; Culbertson & Adger, 2014). The semantic relations between these elements are shown in Figure 1, and orders which are isomorphic to them can be read off directly without swapping the position of any of the modifiers. For example, N-Adj-Num-Dem and Dem-Num-N-Adj are isomorphic, Num-Dem-N-Adj and Adj-Num-Dem-N are not.

Artificial language learning experiments show that English-speaking participants trained only on phrases with single postnominal modifiers infer relative modifier orders that are isomorphic (e.g., N-Adj-Num-Dem; Culbertson & Adger, 2014). However, this study does not provide unambiguous evidence for a universal isomorphism bias, since English-speakers may have learned it from their L1 (Dem-Num-Adj-N is isomorphic). We use the silent gesture paradigm to test this bias in a modality distinct from participants' previous experience.

Stimuli consisted of simple pictures with a set (4 or 5; Num) of triangles or squares (N), all either spotted or striped (Adj). On each trial a stimulus appeared in one of two positions—proximal or distal to the participant (Dem). Participants were told to use gesture to communicate all the relevant information to another person. There is no training, therefore this is a test of naturalness of ordering.

Participants (N=20; native-English speakers, no experience with sign languages) each provided 32 gesture sequences. Each sequence was coded and then scored according to whether it used post-nominal modifiers, and whether the relative order of the modifiers provided was isomorphic. The former measure, shown in Figure 2A, reveals that in general participants did not show a tendency to use English order—most dramatically, almost all gestures provided used a post-nominal adjective. This accords with a typological tendency that English violates (Greenberg, 1963). Critically, gestures also showed a very strong tendency toward isomorphic orders (Figure 2B) among all modifier pairs—whether pre- or post-nominal—supporting the hypothesis that Universal 20 reflects a cognitive bias favoring isomorphism.

Keywords: silent gesture, word order universals, noun phrase



# Mind-mindedness and maternal pointing

Elizabeth Kirk<sup>1</sup>, Lisa Wheatley<sup>2</sup>

<sup>1</sup> University of York [York] – Heslington, York, YO10 5DD, United Kingdom <sup>2</sup> University of Hertfordshire – United Kingdom

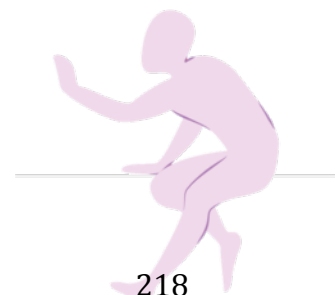
It has been well established that maternal pointing is a significant feature of the language- learning environment of the young infant, contributing significantly to vocabulary development (Rowe, 2000; Rowe & Goldin-Meadow, 2009). Individual variation exists in maternal gesture frequency and this in turn contributes to infants' gesture rate, and vocabulary (Rowe & Goldin-Meadow, 2009). Socio-economic status has been identified to account for some of this variation of maternal pointing (Rowe, 2000; Rowe & Goldin-Meadow, 2009). But what drives this relationship between SES and maternal communication?

Researchers have suggested that mothers who address more points to their children may view their children as understanding more (e.g. Rowe, 2000), yet this has not been tested empirically, until now. Research has identified a relationship between infant gesture and maternal mental state talk (e.g. Olson & Masur, 2011; Slaughter, Peterson, Carpenter, 2009), however the relationship between a mother's gesture and her tendency to talk about her child's inner mental states has been overlooked.

We tested the hypothesis that mothers who direct more points towards their infants would score higher on mind-mindedness. Mind-mindedness refers to the proclivity of the caregiver to treat their infant as having minds of their own and is operationalized by a caregiver's tendency to comment appropriately on their child's mental states (Meins & Fernyhough, 2015). Rather than being a trait like quality, mind-mindedness is a facet of close relationships (Meins et al., 2014). Mind-mindedness has been found to be a significant predictor of child outcomes, including theory of mind (e.g. Kirk et al., 2015) and behavioural difficulties (Meins, Centifanti, Fernyhough & Fishburn, 2013). We propose that infant-directed gestures may be a behavioural manifestation of mind-mindedness.

We videotaped 44 mother-infant dyads looking at two novel picture books for 10 minutes when infants were aged 12 months. Mothers' gesture production was coded to include all instances of imperative points, declarative points and symbolic gestures. Mind-mindedness was coded from mother's appropriate mind-related comments on her child's thoughts, feelings or desires. We found that there was a significant positive correlation between mind-mindedness and maternal gesture. Thus mothers who perceived their child as an individual with a mind were more likely to use gestures when interacting with them. Our findings make a significant contribution to the literature by elucidating the socio-cognitive underpinnings of maternal gesture.

Keywords: parent, child interaction, mind, mindedness, pointing, developmental



# How do gesture influence thinking and speaking? The Gesture-for-Conceptualization Hypothesis

Sotaro Kita <sup>1</sup>, Martha Alibali , Mingyuan Chu <sup>2</sup>

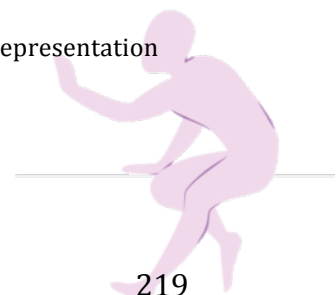
<sup>1</sup> Department of Psychology, University of Warwick – CV4 7AL Coventry, United Kingdom <sup>2</sup> University of Aberdeen [Aberdeen] – United Kingdom

This presentation concerns a theory on how co-speech and co-thought representational gestures influence the gesturer's own mental representations and processes in speaking and thinking. We propose the Gesture-for-Conceptualization Hypothesis, which has two components. First, co-speech and co-thought representational gestures shape the ways we conceptualize information, through four basic functions: gesture activates, manipulates, packages and explores spatio-motoric representations for the purposes of speaking and thinking. Second, the schematic nature of gestural representation enables these four functions. In these ways, gesture facilitates computation and generates novel ideas, strategies and solutions for various cognitive tasks. The four proposed functions are supported by the following evidence. The activation function is supported by the findings that difficulty in maintaining spatio-motoric information triggers gestures (e.g., de Ruiter, 1998), and gesturing promotes activation of spatio-motoric information in problem solving (e.g., Alibali, Spencer et al., 2011). The manipulation function is supported by the findings that difficulty in manipulation of spatio-motoric information triggers gesture and gesturing facilitates manipulation of spatio-motoric information (Chu & Kita, 2011). The packaging function is supported by the findings that difficulty in information packaging triggers gestures (e.g., Hostetter, Alibali & Kita, 2007), and gesturing influences information packaging (e.g., Mol & Kita, 2012). The exploration function is supported by the findings that difficult tasks trigger information exploration in gesture (e.g., Alibali, Kita & Young, 2000), and gestures enable access to a wider range of conceptualizations (e.g., Broaders et al., 2007).

To understand these functions, it is important to consider how gesture is related to practical actions. We take the position that representational gesture is generated by the same process that also generates practical actions (Kita & Ozyurek, 2003). That is, gesture is a representational use of the action generation system (Chu & Kita, 2015; Hostetter & Alibali, 2008). Because gesture originates from the action system, gesture can influence thoughts in the spatio-motoric domain, based on our bodily experiences in interacting with the world. However, gesture differs from practical actions in an important way: gestures are schematic representations (Chu & Kita, 2008; Novack et al., 2014). Schematization makes gestural representations (1) focused on the essentials, which makes it easy to generalize the knowledge to new situations (Goldin-Meadow, 2015), (2) efficiently manipulable, as representations are not bound to physical constraints, and (3) flexible, which makes it easier to alter them into "light-weight" and easy-to-process formats. Thus, gestural schematization makes the activation, manipulation, packaging and exploration processes more effective and efficient. Furthermore, schematization also creates a unique landscape of information for exploration that is not accessible by verbal processing or other perceptual-motor processing.

In summary, the framework provides a novel, parsimonious and comprehensive theory of the self-oriented functions of gestures.

Keywords: self, oriented functions, co, thought gestures, co, speech gestures, spatio, motoric representation



# Words that love or hate gestures: a bottom-up corpus study on the (dis)affinity between co-speech gestures and verbal patterns

Kasper Kok

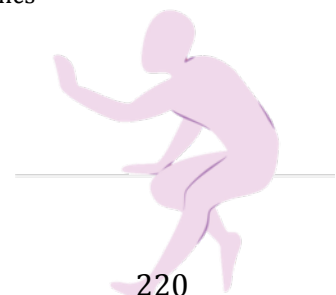
Vrije Universiteit Amsterdam [Amsterdam] (VU Amsterdam) – De Boelelaan 1105 1081 HV Amsterdam, Netherlands

Despite the frequent employment of corpora in research on gesture, there is relatively little convergence between gesture studies and methods from (computational) corpus linguistics. Most corpus-based gesture research, in fact, remains at least partly qualitative by nature. Previous studies for instance manually annotate all gestures in the corpus terms of their 'lexical affiliates' before inquiring which verbal patterns and grammatical categories they relate to (Hadar et al. 1999). Although such contributions are no doubt valuable, they have at least two pitfalls: their generalizability is hampered because the multimodal corpora employed are often rather small; their objectivity is limited because they require at least one round of human judgment.

The current contribution aims to overcome these issues. We report on a fully bottom-up corpus study based on one of the largest multimodal corpora available: the Bielefeld Speech and Gesture Alignment (SaGA) corpus (Lücking 2013). The corpus comprises recordings of (German) direction giving discourse and contains about 31,500 words and over 3,300 gesture strokes. The size of the corpus allows for a thorough exploration of the verbal patterns that co-occur most and least frequently with manual gestures. We divided the corpus into a speech-only part and a gesture-accompanied part, based on temporal overlap between spoken words and the gesture strokes. To avoid reliance on an arbitrary definition of 'temporal overlap', the sampling of the sub-corpora was repeated four times with different time windows: 0, 1, 2 and 3 seconds before and after the strokes. As a measure of gesture-attraction/repulsion, we looked at the ratio of the relative frequencies of the words in each of the two sub-corpora.

The first question we asked is what words have a higher or lower frequency in the gesture-accompanied corpus than in the speech-only corpus. We found that gesture-attraction scores exceed chance level for generic motion verbs (e.g. *gehen* 'to go') as well as locative and motion-related adverbs (e.g. *hier* 'here', *links* 'left') and proximal demonstratives (*dies* 'this'). Discourse particles and personal pronouns were found to be significantly 'gesture-repellent'. In a second analysis we applied the same procedure to the corresponding part-of-speech tags, and found that nouns and adverbs are likely to co-occur with gesture, but, interestingly, low scores were obtained for verbs and adjectives. A final analysis, where the corpora were reorganized as collections of bigrams instead of single words, revealed high attraction values for certain specific constructions (e.g., *so ein* 'such a'). We furthermore found that the choice of the temporal window that defined speech-gesture co-occurrence modulated some dimensions of the results. Overall, in addition to its methodological novelty, this study provides objective insights into the range of possible linguistic functions gestures may carry out and the types of lexical-grammatical elements they relate to.

Keywords: Gesture, corpus methods, linguistics, multimodal grammar, speech, gesture dynamics



# Less time to speak leads to less speech-gesture redundancy

Stefan Kopp, Kirsten Bergmann

Bielefeld University – P.O. Box 100 131 D-33501 Bielefeld, Germany

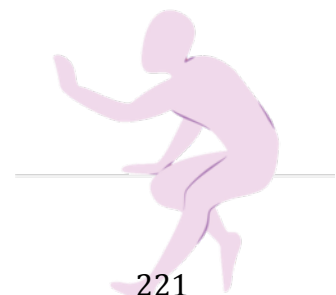
Depending on how much information gestures convey beyond the meaning of the words they accompany, gestures can be classified along a continuum of (non-)redundancy. Empirical evidence shows that the way how speakers actually coordinate speech and gesture semantics is affected by cognitive factors like speech production problems (Bavelas et al. 2002; Bergmann & Kopp 2006), conceptualization load (Melinger & Kita 2007), or inter-individual differences in terms of verbal or spatial skills (Hostetter & Alibali 2007, 2011; Chu et al. 2013). In the literature, different models of speech and gesture production have been proposed (e.g., de Ruiter 2000; Kita & Özyürek 2003; Hostetter & Alibali 2008). One major distinguishing feature is the point where in the production process cross-modal coordination can take place. A concrete picture of the cognitive processes underlying semantic coordination is, however, still missing.

In previous work, we developed a computational model to simulate semantic speech-gesture coordination in terms of the underlying cognitive processes (Kopp et al. 2013). Integrated into an overall speech-gesture production framework (Bergmann & Kopp 2009), a multimodal working memory serves as the central component in this model. In line with theoretical production models, it comprises a symbolic-propositional representation for language-, and a visuo-spatial one for gesture production. As an interface between these modality-specific representations, supramodal concepts are implemented which link the corresponding visuo-spatial properties to a corresponding propositional denotation. Cognitive processes operating upon the memory structures are modeled in terms of dynamic activation spreading principles.

We quantified our modeling results in simulation experiments in which we manipulated the available time (in terms of memory update cycles) before the model has to come up with a sentence and a gesture. We analyzed the resulting multimodal utterances with respect to semantic coordination: Non-redundant gestures are dominant in those runs with stricter temporal limitations, while redundant ones become more likely when time available is increased.

To validate the predictions of our model, we conducted a controlled experiment in which we empirically tested the impact of limiting cognitive resource on the semantic coordination of speech and gesture. In a within-subject design with manipulated the time pressure under which participants gave spatial descriptions for an interlocutor. The resulting behavior was analyzed with a micro-analytic coding approach for semantic features conveyed in speech and/or gesture (e.g. Beattie & Shovelton 2001, Holler & Beattie 2003, Bergmann et al. 2011).

Keywords: Computational Modeling, Semantic Coordination, Continuum of Redundancy, Conceptualization





# Gestures in individual mathematical learning processes: Perspectives for the researcher and for the learner

Christina Krause, Alexander Salle

University of Osnabrück – Germany

Gestures are considered having a non-neglectable impact on learning mathematics in social interaction (e. g. Arzarello & Paola 2007, Arzarello et al. 2005, Dreyfus et al. 2014, Krause 2016, Radford 2003, Rasmussen et al. 2004), both as means of expression and as means for learning. With increasing age and especially on university level, it becomes more and more important for students to learn by themselves. One way of individual learning is given by understanding worked-out examples. So far, analyzing individual learning processes are mainly restricted to the analysis of verbal utterances, instructing the students to ‘think aloud’. This approach does not integrate implicit knowledge involved in the learning process. While this knowledge cannot be captured in words by the learner, his gestures may reveal it (Broaders et al. 2007). Therefore, we adopt an embodied approach on learning and aim to integrate the students’ gesture use in the analysis of individual learning processes in mathematics. Doing this both from a descriptive analytical, as well as from an epistemic perspective, we ask:

- (1) What does students’ use of gestures reveal about how they work with worked-out examples?
- (2) How may the gesture use help the students to access worked-out examples?

These questions have been investigated in an empirical qualitative study. Therefor, 33 undergraduate students have been videotaped, being asked to think aloud while trying to understand a worked-out example dealing with the multiplication of complex numbers in three different ways. The core units of analysis concerned co-speech gestures in their interplay with speech and inscription: While verbal utterances provide the contextual frame for gesture analysis, gestures have been grouped by their ‘referential levels’ (Krause, 2016), indicating in how far they detach from concrete inscription. To answer the first question, we identified the surplus for the descriptive analysis by conducting first a speech-based analysis before also considering the students’ gesture use. Based on this extended analysis, hypotheses were generated to answer the second research question.

Integrating students’ gesture use provided analytical insights in several ways: It revealed which aspects the students consider relevant when navigating within the given example. Also, gestures embody dynamic approaches to examples given as static and enrich speech with complementary semantic information. Concerning the second question, three main hypotheses are pointed out: Gestures provide anchorpoints within the inscription that may help keeping focus and making visual links, what may reduce cognitive load (Mayer & Fiorella 2014). Gestures embody dynamic aspects of an object while generating ideas about it (cf. Schwartz & Black 1996), and they can help expressing ideas without a necessity for figuring out details. Hereby, core features of approaches not yet elaborated are formed and presented holistically and reflexively to oneself, what may lead to new ideas.

Keywords: gestures, individual learning, mathematics, multimodality, functions



# The role of gesture in two Bantu languages and a non-standard language variety

Ramona Kunene-Nicolas, Nonhlanhla Ntuli

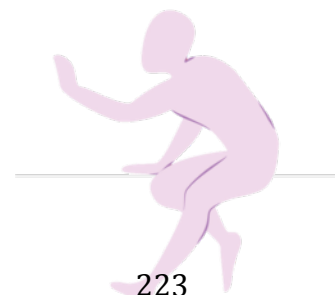
The University of the Witwatersrand (WITS) – South Africa

The past 10 years have seen a gradual decline of 6 of the official languages of South Africa (Census, 2011). In an effort to counter this decline some researchers have called for the improvement of existing non-standard language varieties, which could serve to improve some of these decreasing Black South African languages (BSALs), (Distsele T, 2014). Non-standard language varieties are 'languages' largely spoken in black townships around South Africa. They are sometimes referred to as stylects, sociolets or speech varieties, due to their structures and functions (Magdeline Princess Bembe & Anne-Marie Beukes, 2007; Nikolas Coupland, 2007). Whilst it is not clear when children are socialised into these varieties it has become a pressing concern in some township schools that children who speak language varieties have a greater challenge in following the curriculum. Applying a psycholinguistic approach, this study seeks to compare two standard languages, Sesotho and isiZulu to a non-standard language variety, Sepitori also known as Pretoria Sotho (Distsele, T, 2014).

Most literature on South African language varieties focus mostly on the semantic and pragmatic description of the words in use and very few have incorporated co-speech gesture which form an intergral part of non-language varieties. Brookes (2001; 2005) documented a vast glossary of 'quotable' gestures that are spoken in one of the township varieties of the East Rand region of Gauteng. This glossary revealed an intricate network of the role of gestures used by males, in fact the very essence of the 'anti-language' examined had a complex gestural code which made the presence of speech optional.

The present study presents the results of an empirical investigation that compares 30 narratives produced by Sesotho, isiZulu and Sepitori speakers. Using the methodology used in the elicitation of speech and gesture by Colletta et al., (2009; 2015), participants watched a speechless short cartoon and then were asked to retell the story they had seen to the interviewer. Narratives were annotated for language complexity; length and type of clause, syntax, as well as story grammar memory recall. Narratives were also annotated for gesture; type of gesture, function of gesture, temporal synchrony to speech and the form of gesture. The focus will be on the discursive performance on speech and gesture. Results show a significant use of meta-narrative clauses from the language variety compared to the standard languages as well as a higher use of pragmatic gestures. The findings also show an interesting use of interactive gestures when retrieving lexical items that are not present in the repertoire of Sepitori.

Keywords: Bantu Language, Non, Standard Language Variety, Narrative Levels, Multimodality, Discursive Performance



# Does viewpoint matter for word recall in second language acquisition?

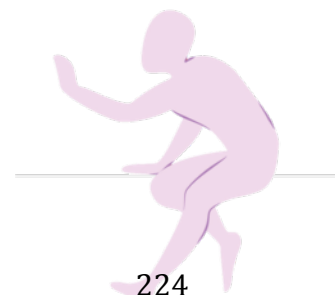
Olga Kushch<sup>1</sup>, Carmen Pérez Vidal<sup>1</sup>, Marianne Gullberg<sup>2</sup>, Pilar Prieto<sup>1,3</sup>

<sup>1</sup> Universitat Pompeu Fabra (UPF) – Roc Boronat 138, 08013, Barcelona, Spain <sup>2</sup> Lund University [Lund] – Paradisgatan 2 Box 117, SE-221 00 Lund, Sweden <sup>3</sup> Institució Catalana de Recerca i Estudis Avançats [Barcelona] (ICREA) – Passeig Lluís Companys, 23 08010 Barcelona - Espanya, Spain

In recent years, different studies have shown the positive impact of representational gestures on word recall when learning a first language (Tellier, 2005; So et al., 2014), and a second language (L2) both by children (e.g., Tellier, 2008) and by adults (e.g., Kelly et al., 2009). Yet, little is known about the potential effects of modes of representation on L2 word recall. In this study, we focus on nouns. Referential gestures can represent nominal referents by depicting their form, or represent an action associated with an object or the way it is manipulated (Ortega et al., 2014). We take these two variants to correspond to observer (OVPT) and character (CVPT) viewpoint modes of representation (McNeill, 1992). OVPT gestures could be said to refer to the nominal feature, and CVPT gestures to represent argument structure. In the current study we investigate the impact of mode of representation on noun recall in an L2. Thirty-six Catalan-dominant speakers participated in an L2 word memorization task. The stimuli consisted of 12 Russian disyllabic words for everyday objects. Each target word was produced by a speaker in one of 4 video conditions: accompanied by an OVPT gesture, by a CVPT gesture, by a beat gesture, or by no gesture. The No-gesture condition served as a baseline control condition, and the beat-gesture condition as a control for visual activity. All gestures were controlled for handedness (bimanual), location in space, and timing relative to the target word. Participants were trained and tested individually. In the training, target words were presented in random order 2 times, according to four within-subject experimental conditions. In the immediately following test participants heard a Russian word and had to select a corresponding Catalan equivalent from three possible options. The results show that participants recalled significantly more nouns presented with OVPT gestures than nouns accompanied by CVPT gestures

These findings indicate that the mode of representation matters for L2 word recall. We suggest that OVPT favors noun recall because the information in gesture and speech match, and therefore facilitates associative gesture-word pairing. By contrast, CVPT gestures provide supplementary information encoding actions related to the noun, thus adding information which may obscure the gesture-noun association, increase cognitive load, and negatively affect word recall. A follow up study will test whether the acquisition of verbs is favored by a more transparent associative mapping between verbs and CVPT gestures.

Keywords: viewpoint, modes of representation, representational gestures, L2 acquisition



# How discourse shapes the understanding of gesture

Silva Ladewig, Lena Hotze, Franziska Boll

European University Viadrina Frankfurt Oder (EUV) – Große Scharrnstraße 59 15230 Frankfurt (Oder)  
Deutschland, Germany

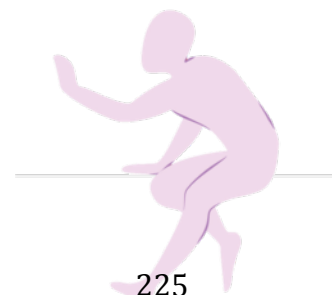
So far, the creation of multimodal meaning has largely been studied from the point of view of the producer and research focused mainly on the investigation of single utterances. In this talk, we will present a slightly different take on the phenomenon of multimodal meaning creation by focusing on the recipient's side of multimodal utterances and by conducting comprehension experiments. In doing so, we approach the question of whether and how the context of a gesture, be it a spoken utterance or a stretch of discourse, matters for the understanding of gestures. The study to be presented, addresses gestures replacing spoken constituents of utterances in sentence final position (Ladewig 2014). These gestures were taken from a corpus of 20 hours of naturally occurring conversations and built the stimuli for three perception experiments. First, we investigated gestures without speech. Second, we examined gestures only in the context of the utterance, they complete and third, we studied gestures in their larger discourse contexts. In each condition, 66 video clips were shown to 15 people (8 female, 7 male). The subjects were asked to watch the video clips and write down a lexical choice they considered best suited for the gesture. Altogether, 2960 lexical choices were elicited which built the basis for the investigation of the comprehended gestural meaning. The extracted gestures as well as the lexical choices were investigated thoroughly with respect to the image schematic and motor patterns they exhibited (Cienki, 2005, Mittelberg 2006). The flow of discourse was reconstructed by applying the timeline annotation procedure for documenting the sequencing of metaphors across modalities, over time and speaker (Müller & Ladewig 2013).

We found that subjects were able to reconstruct gestural meaning in all three conditions. However, we could observe that the comprehended gestural meaning became increasingly specified the broader the discourse context became. Two different ways of specification could be identified, regarding different aspects of gestural meaning constitution:

The semantic information of gestures is foregrounded through the flow of discourse, making the gestural meaning more specific. This regards the intensional meaning of gestures.

The semantic space, the gesture occupies, is narrowed down and specified through the flow of discourse, giving rise to a different or a specified gestural reference object. This regards the extensional meaning of gestures. Based on our observations, we argue that discourse affects the perception and the understanding of gestures. Gestures are capable of conveying meaning on their own but the way gestural meaning is "construed" (Langacker, 1991) highly depends on the flow of discourse a gesture is situated in.

Keywords: dynamic multimodal communication, discourse, recipient, gesture and grammar



# Using an animated social robot to promote gestural recognition and production skills in children with Autism Spectrum Disorders

Ka-Yee Carrie Lam<sup>1</sup>, Kit-Yi Miranda Wong<sup>1</sup>, John-John Cabibihan<sup>2</sup>, Him-Yau Hannah Chan<sup>1</sup>, Ching Ginny Wong<sup>1</sup>, Tsz Lok Lee<sup>1</sup>, Phoebe Ng<sup>1</sup>, Anthony Chui<sup>1</sup>, Wing Leung<sup>1</sup>, Chun-Hung Sunny Chan<sup>3</sup>, Wing Chee So<sup>1</sup>

<sup>1</sup> The Chinese University of Hong Kong – Hong Kong SAR China <sup>2</sup> Qatar University – Qatar <sup>3</sup> Hong Chi Morninghill School, Tsui Lam – Hong Kong SAR China

Previous research has shown that young children with Autism Spectrum Disorders (ASD) have delayed gestural development, in comparison to their age-matched typically-developing children. Early and recent studies reported reduced gesture rates in children with ASD (Bartak et al., 1975; Charman, Drew, Baird, & Baird, 2003; Luyster, Lopez, & Lord, 2007). Of the different types of gestures, some studies have found that young children with ASD are delayed in producing proto-declarative gestures, markers, and iconic gestures (e.g., Baron-Cohen, 1989; Carpenter, Pennington, & Rogers, 2002; Mastrogiuseppe et al., 2015; Wetherby & Prizant, 2002). Two recent studies showed that gesture deficit is still found among school-aged children with ASD (So, Lui, Tsz, & Sit, 2015; So, Wong, Lui, & Yip, 2015). Compared to their typically developing counterparts, six- to twelve-year-old children with ASD gesture less often and use fewer types of gestures especially markers (So et al., 2015b). They also have difficulty in producing iconic gestures at specified locations to identify referents (So et al., 2015a).

As a result, the present study designed an intervention program for teaching school-aged children with ASD, especially those with low-functioning ASD, gesture comprehension as well as gesture production. Since individuals with ASD tend to have low interest towards other humans (e.g., Klin & Jones, 2006; Klin, et al., 2009) and are more responsive and quicker to respond to feedback given by a technological object than a human (e.g., Pierno, Mari, Lusher, & Castiello, 2008), we taught children with low-functioning ASD twenty iconic gestures and markers using an animated humanoid robot (NAO V5, Aldebaran Robotics, France).

Six- to twelve-year-old children with ASD (N=20; IQs < 70) were trained to recognize twenty iconic gestures and markers produced by animated NAO in Phase I, imitate these gestures in Phase II, and produce them in appropriate social contexts in Phase III (Fig.1). The intervention program lasted for ten weeks, with each phase lasting for two weeks. In each phase, there were four training sessions, twice per week. The effectiveness of the program was evaluated by standardized tests, which were administered before (i.e., pretest) and immediately after (i.e., posttest) training in each phase. Significant differences between the results of pre- and post-tests were found in all phases,  $F(1,16)=7.27$ ,  $p<.02$ ,  $\eta^2=.31$ , after controlling for children's motor memory and visual memory skills (Fig.2). In addition, the results of item analyses showed that children showed an overall improvement in recognition and production across all twenty gestures in the posttests. However, children were found to commit more errors in the handshapes and movements of gestures, compared to the left/right/both hands involved and placements of gestures, in Phases II and III. Overall, robot-based intervention is effective in teaching children with ASD to recognize and produce gestures.

Keywords: Autism Spectrum Disorders, Intervention, Gesture, Social Robot

# Co-speech gestures and the attention system of language in force-dynamically specified grammatical categories: A study in multimodal cognitive semantics

Guenther Lampert

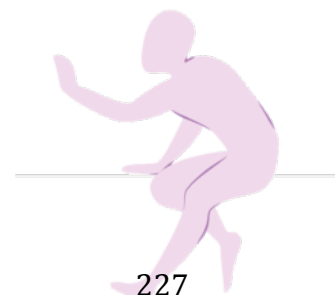
JGU Mainz, Department of English and Linguistics (JGU) – Jakob-Welder-Weg 18, 55128 Mainz, Germany

The integration of grammatical constructions and co-speech gestures in terms of speaker- created gesture-speech ensembles (cf. Kendon 2004) is still an under-researched field of linguistics- even if observations to the effect that such constructions can be instantiated in different media have sporadically been put forward (for a recent survey see Fricke 2015). The available studies supporting a truly multimodal conception of grammar have had their starting points either in particular gestures (by extension, also in families of gestures; cf. Fricke et al. 2014) or in specific linguistic forms or form classes (e.g., deictic expressions or nominal groups; cf. Stukenbrock 2015 and Fricke 2012). Less well represented in research, however, are top-down approaches that would seek for correlations of larger conceptually defined grammatical categories and potential gestural substitutes, complements, or reinforcements. Exemplary studies in this vein are: Harrison (2013) on negation; the audio-visual research project of the Prieto team in Barcelona, which has just embarked on describing the multimodal signaling of epistemic and evidential stances; see Roseano et al. (2015); investigations of the multimodality of quotations; cf. M. Lampert (2015); and, last but not least, Leonard Talmy's incipient project on the targeting system of language; see Talmy (2012) and (forthcoming a).

Given this research situation, my talk, which explicitly argues in favor of a multimodal extension of Talmy's cognitive semantics framework, will inevitably have to be more heuristic and programmatic than data-driven. To illustrate my agenda, it will present a small-scale case study on potential gestural affiliations of instantiations of the conceptual category of Force Dynamics, which in cognitive semantics has (since Talmy 1988) canonically been taken to specify the non- epistemic meanings of the Greater Modal System (of English) and of negation (see Co-Author and Author 2013). Based on a corpus of selected U.S. presidential speeches, the paper will suggest that the concrete speech-gesture ensembles created on-line are seen to depend on the concrete strengths of attention associated with force-dynamically specified linguistic items in discourse-that is, with different degrees of attentional activation, attenuation, and inhibition (see Talmy, forthcoming b).

And, in contrast to the results offered by the studies on negation and epistemic stance mentioned above, my own case study will reveal that in the register under scrutiny force-dynamically specified items like the closed-class non-epistemic modals (must, should, may) and their lexical equivalents (necessary, obligatory, and perhaps) do not seem to significantly yield co-speech gestures of any kind. My explanation of this finding rests on the observation that these items are characterized by both a general and a discoursal attenuation of attention, which concomitantly leads to a suppression of potential force-dynamically specified modal-pragmatic gestures, like those represented in the open-hand or palm-down paradigms (see Kendon 2004 or Harrison 2013).

Keywords: multimodality, co, speech gestures, cognitive semantics, force, dynamics, gesture, speech ensembles, family of gestures, attention system





# The Kinetics of Quoting: Attention to Quotations as a Multimodal Phenomenon

Martina Lampert

Johannes Gutenberg University Mainz (JGU Mainz) – D-55099 Mainz, Germany

Gesture research has generally postulated and occasionally addressed discourse management functions of visible bodily actions, including reference to quote-indexing potentials of manual gestures, facial displays, gaze direction, and/or body posture (e.g., McNeill 1992; McNeill et al. 2002; Kendon 2004, 2013; Ekman 1997; Bavelas & Chovil 1997; Sidnell 2006; Thompson & Suzuki 2014).

Recognized as establishing a particular discourse layer, quotations have received some attention in story telling contexts: Lorenz' (2007:103) corpus-based study on personal narratives finds positive evidence, both qualitative and quantitative, for all kinetic parameters to be sufficiently distinct perceptually across quoted and non-quoted discourse, identifying a pervasive co-alignment of gestures, prosody, and quotations that appear to make "the narrative structure ... transparent" in the non-verbal modalities. More recently, Maury-Rouan (2011), drawing on interview data about a life story, establishes co-occurrences between changes in vocal, facial, gestural, and postural parameters and shifts in footing, i.e., reported speech.

Against this background, I will, in an integrative multimodal, cognitive semantics perspective, outline an agenda to more generally frame quotations as a modality- and attention-sensitive phenomenon, illustrating how the verbal, vocal, and kinetic dimensions of language variably and multiply interact in meaning construction in spoken settings. Rooted in Talmy's (2007, forthcoming) causal dynamics of the trigger-and-target construct, multimodal cues represent devices dedicated to direct some hearer attention from the quotation's referential content to a concomitant associated with it. Quite generally, hearers would expect to be somehow alerted to a quotation's metalinguistic status; hence quoting invites an attention-driven analysis: Quotatives such as *be like* or *quote* are then re-analyzed as triggering devices responsive to modality-specific and discourse-functional distinctions, with a tendency to differentially interact with prosodic, manual, facial, and bodily gestures as well as gaze to produce attentional effects on the hearer, which range along Talmy's proposed attentional gradient from activation over attenuation to inhibition, i.e., to foreground or background, even suppress, the metalinguistic status of a quotation. Such variability apparently corresponds to the inherent dynamism of voice and gestures as non-discrete and non-digital categories.

Contrary to a widely held belief, close inspection of more than 250 video-taped instances of quoting from experienced public US speakers reveals prosodic and/or gestural attenuation or inhibition: Quotations remain largely indiscriminate from their environment, leaving the other voice both unidentified and susceptible to various discourse-functional effects. As gestures and prosody seem to call for a linguistics of particularity, first, in light of the unconstrainedness (McNeill 1992, 2013; Ekman 1997) and the non-discreteness of the nonverbal dimensions and, second, the open-endedness of discourse-functional demands, two samples from opposite ends of a continuum of public talk will be presented – a complex quotation from a talk by Noam Chomsky and an excerpt from one of Serena Williams' press conferences.

Keywords: quotation, discourse function, multimodality, attention, Talmy



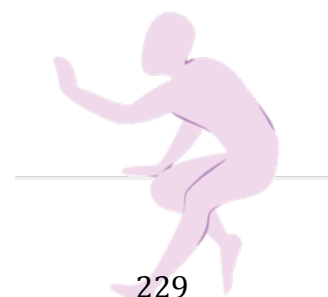
# Teaching Thinking for Speaking in a Second Language

James Lantolf<sup>1</sup>, Gale Stam<sup>2</sup>, Tetyana Smotrova<sup>3</sup>, Kimberly Buescher<sup>4</sup>

<sup>1</sup> The Pennsylvania State University (PSU) – Department of Applied Linguistics College of Liberal Arts Pennsylvania State University University Park, PA 16802, United States <sup>2</sup> National Louis University (NLU) – 122 S. Michigan Avenue Chicago, IL 60603, United States <sup>3</sup> National University of Singapore (NUS) – CELC 03-09 (10 Architecture Drive, Singapore 117511), Singapore <sup>4</sup> The Pennsylvania State University – Department of French and Francophone Studies The Pennsylvania State University 231 Burrowes Building University Park, PA 16802, United States

Languages differ typologically in how the semantic domain of motion is indicated lexically and syntactically. In motion events, researchers differentiate between verb-framed languages (V-languages), where directionality or path is encoded on the verb and satellite-framed languages (S-languages), where it is encoded on a satellite and manner is encoded on the verb (Talmy, 2000). To date, the research literature provides scant evidence that L1 speakers are able to fully shift from their L1 thinking for speaking (TFS) pattern about motion events to that of an L2. For example, speakers of L1 V-languages learning L2 S-languages still exhibit some V-language patterns in thinking for speaking about motion events in the L2 not just verbally but crucially in both speech and gesture (e. g., Kellerman and van Hoof, 2003; Choi and Lantolf, 2008; Stam 2006, 2010, 2014, 2015). This is true even for L2 learners with extensive immersion exposure to a new language. Given that exposure alone does not promote a complete shift in TFS patterns, the research question addressed in this talk is whether well-organized systematic explicit instruction in L2 TFS can facilitate a shift from L1 to L2 TFS that encompasses the ability to appropriately express verbally and gesturally path and manner of motion in the L2. More specifically, it asks if speakers of a Verb-framed L1 (Spanish) can, through instruction, acquire the TFS patterns of a Satellite-framed L2 (English). Eight L1 Spanish-speaking learners of L2 English were videotaped narrating cartoon episodes before and after explicit instruction in English motion verbs and satellite constructions but without any mention of gesture patterns. Prior to instruction the learners' thinking for speaking patterns in English showed no evidence of L2 TFS patterns. Following the instruction, their thinking for speaking patterns in English showed evidence of L2 TFS patterns in both speech and crucially in gesture, including appropriate expression of path and manner in speech and gesture and the accumulation of path components within a single clause along with boundary crossing gestures. Findings indicate that explicit instruction (even short term) is able to produce changes in TFS patterns that were not possible in extensive immersion.

Keywords: Teaching Thinking for Speaking, Spanish, English, Second Language, Cospeech gestures



# Learning through physical action and gestural reflection in a first-person augmented reality science simulation

Christine Lee, David Deliema, Noel Enyedy

University of California Los Angeles (UCLA) – United States

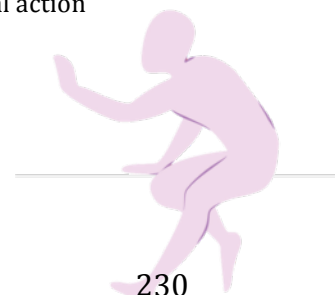
Theoretical framework and research question Educational theorists have long recognized that learning entails a back-and-forth between action and reflection (e.g. Dewey, 1938). This reflective process is particularly apparent in first-person participatory simulations of science content (Colella, 2000; Enyedy, Danish Delacruz, Kumar, 2012), where students frequently suspend their play in the simulation to deconstruct, replay, or plan actions. This practice resembles what Goffman (1974) describes as keying, and what Kirsh (2011) describes in dance as marking. In both cases, participants modify a primary activity for planning, communication, and reflection. In our research, we adopt a distributed perspective on cognition (Hutchins, 1995) to understand how a community of students moves between embodied performance within a participatory science simulation and embodied reflection both during and after the simulation. We aim to understand how this action-reflection loop impacts the students' inquiry about the target scientific phenomenon.

We are studying this question in the context of an augmented reality simulation interface that we designed for 1st and 2nd graders (n=125). Using Xbox Kinect sensors, up to twelve students simultaneously immerse in the first-person perspective of water particles to inquire about the structure of particles in liquid, solid, and gas. We approached our data using multimodal interaction analyses (Jordan & Henderson, 1995) of a small number of episodes to chart students and instructors' public organization of performing as particles (see Image 1), reflecting with the body on performance (see Image 2), and documenting ideas about particles (see Image 3).

Our results show that students' inquiry process is a dialectical relationship between performing as particles, reflecting with gesture on particles, and documenting students' thinking about how particles change states. The augmented-reality, motion-tracking technology guides the students' scientific inquiry process by allowing them to use their full bodies alongside a moving visual simulation as the multimodal canvas for discovering new patterns in particle behavior. After students perform as water particles, they commonly join together, using gesture to recreate the complexity of the earlier performance, where they gradually abstract important principles about how particles behave. These participant-viewpoint and observer-viewpoint gestures become public practices for abstracting the relevant characteristics of speed and distance that matter for particle state change. These reflective conversations in turn lead students to write down their ideas about how particles behave, which in subsequent sessions are applied and interrogated in performance.

We see this analysis as significant because it is compatible with intrapersonal cognitive models that view gesture as "a unique bridge between action and abstract thought" (Goldin-Meadow & Beilock, 2010). Our research extends this finding by showing how a community of learners collectively and publicly organizes this process of abstraction.

Keywords: Augmented reality, Science reflection, Inquiry process, Gestural reflection, Physical action



# Do Interpreters Draw Meaning from a Speaker's Multimodal Text?

Lorraine Leeson<sup>1</sup>, Terry Janzen<sup>2</sup>, Barbara Shaffer<sup>3</sup>

<sup>1</sup>Trinity College Dublin – Ireland <sup>2</sup>University of Manitoba – Canada <sup>3</sup>University of New Mexico – United States

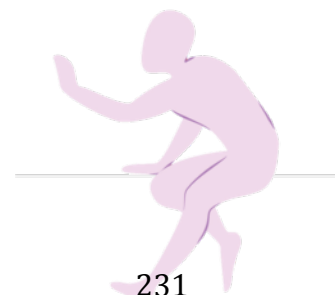
It is well understood, from a multimodal perspective, that speakers' gestures contribute meaningful elements to a text of varying sorts, everything from beats and 'lexical' material not found in the speech itself (Kendon 2004, 2011) to viewpoint and discourse organization (e.g., Parrill 2012). Observers, it has been claimed, construct meaning by synthesizing all elements from such composite utterances (Enfield 2009).

But what of interpreters? When a spoken text is interpreted into another language, do the speaker's gestures contribute to the meaning constructed by the interpreter? In this study, we ask these questions:

- 1) Is the interpreter consciously aware of gestures the speaker makes?
- 2) (Whether conscious or not) do speakers' gestures contribute to the interpreter's constructed meaning?
- 3) Is there evidence that interpreters structure their target text (the text they produce) to reflect the speaker's gestural information?
- 4) Do interpreters incorporate the speaker's gestures into their own multimodal target text?

This gestural study is part of a larger research project in which we investigate interpreters' conceptualization of speakers' texts along with their own mental processing as they formulated the target text in a different language. Stimuli consisted of two video-recorded texts in spoken English, in which the speakers' gestures are fully visible. Subjects were interpreters with at least five years experience, simultaneously interpreting the text into, variously, spoken Spanish, spoken French, Irish Sign Language or American Sign Language. Subjects viewed (and listened to) the entire texts once through before interpreting. The interpretations were video recorded, and were followed by an extensive "think aloud protocol" (TAP), also recorded, in which the subject and one of the researchers viewed the interpretation against the source text and discussed the interpreter's target text choices, along with reasoning and motivations behind the choices. Results show a number of tendencies. First, interpreters tend not initially to be cognizant of speakers' gestures, and yet it is obvious they frequently draw from them. They are often surprised during the TAP that speakers' gestural information is in fact apparent in the content of their target texts, and sometimes mimicked in their own gesturing. Second, however, once instances of speakers gesturing was pointed out them, they seemed to discover this as a "new" source of information that they could take advantage of, that would aid them in constructing meaning or organizing their own texts. And third, it becomes apparent that sometimes in spite of meaningful gesturing, subjects structured their text without regard to these, thus creating texts that differed from the intention of the speaker, either in how something might be profiled, or how it lent cohesion to the text.

Keywords: Multimodal texts, interpretation, signed/spoken languages



# Gestures: a Resource for Describing an Android in an Intercultural Interaction

Augustin Lefebvre<sup>1</sup>, Mayumi Bono<sup>2</sup>

<sup>1</sup> Centre Interuniversitaire d'études hongroises et finlandaises (CIEHCIEFi) – Université de la Sorbonne nouvelle - Paris III – France <sup>2</sup> Digital Content and Media Sciences Research Division, National Institute of Informatics /School of Multidisciplinary Science, SOKENDAI(The Graduate University For Advanced Studies) – Japan

Gestures have been investigated in intercultural settings as resources mobilized when a participant lacks lexical knowledge to express a particular meaning: embodied completions are gestures used instead of lexical unit to complete a turn (e.g. Mori and Hayashi, 2006; Olsher, 2004).

In this study, we propose to examine the use of gestures in an intercultural setting characterized by two specificities: the presence of an interpreter who integrally translates, i.e. supplies lexical resources; and the activity of discovering an unknown, ambiguous object, half-machine, half-human, which creates for the participants a semantic problem.

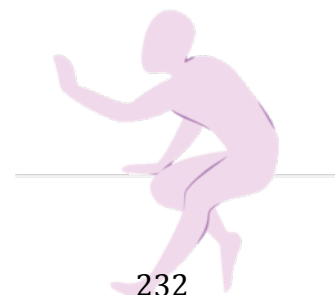
In the perspective of conversation analysis (Sacks et al. 1974), we rely on the close observation of naturally occurring interactions video recorded in Japan as part of the Robot-Theater-Project launched by Ishiguro Hiroshi and Hirata Oriza. The goal of this project is to use an android- actor in a theatrical play with human actors.

In the extract we will analyze, the French actors discover for the first time their android partner and try to understand how it works, what it can do or not. We observe participants massively produce gestures. What functions do the gestures play in this particular intercultural setting?

We examine this question by analyzing a collection of nine gestures which appear in the same sequential context (Schegloff, 2007): 1- verbally, a participant asks a question about or describes a specific part of the robot's body or behavior. 2- the interpreter translates the question or description. Systematically, 1- in the first turn, the participant performs a gesture which makes visible a part of the robot's body or action; 2- when translating the previous turn, the interpreter, repeats the gesture that has been produced by the previous speaker. In some cases, the description of the robot's behavior is pursued in a third turn in which the robot's body is manipulated or touched by the participants.

Gestures, as visible actions, appear as a crucial resource to the participants to this intercultural setting to build and share the perception of the android. Through gestures, participants anchor the description of the android's abilities on a common background, i.e. their own "body in interaction" (Alac 2009: 492). Furthermore, observing the actors' gestures allows us to understand how they build a perception of the android which is relevant for their future interaction with it on stage: they project the way the android will behave and the consequences of its abilities for their interaction with it on stage. This study contributes also to understand the function of gestures in the identification by the interpreter of interactional and semantic units to translate (e.g. Merlino 2014).

Keywords: interaction, gesture, interculturality, android, sequence



# "Idiogests": semantically motivated gestural idiolects

Maarten Lemmens

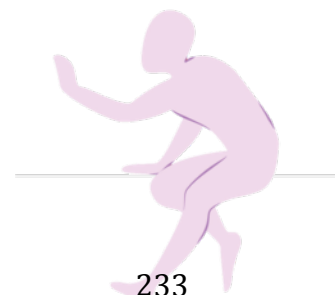
Université Lille 3, France

Research on co-verbal gestures has revealed that gestures are cognitively and communicatively quite advantageous to both speakers and hearers. Despite these communicative benefits, there is considerable variation in speakers' gestural behaviour, which can be attributed to a variety of factors (Gullberg, de Bot, & Volterra 2008). There are socio-linguistic factors, such as the speaker's age (Alibali et al. 2009), gender (Briton & Hall 1995), or culture (Graham & Argyle 1975; Kendon 2004; Kita 2009). Other factors are cognitive in nature, such as psychopathology and disorders (Gillstrom & Hare 1988; Bello, Capirci, & Volterra 2004) or personality traits ("extraversion, neuroticism, conscientiousness, agreeableness, and openness to experience", Hostetter & Potthoff 2012). Finally, the speaker's communicative skills are a major factor as well (Hostetter & Alibali 2007; Krauss, Chen, & Gottesman 2000). This paper adds another layer to gestural interspeaker variation showing how idiosyncratic gestural variation can be motivated semantically. Our study is based on elicited descriptions of 5 (wordless) pictures by native speakers and learners of Dutch, French, and English. For this presentation, we will focus mostly on the descriptions by the native speakers Dutch. Our data confirms the gestural variation between speakers: overall, some subjects gesture quite a bit, others, much less. For some pictures, the contrast is as large as zero gestures for one speaker compared to 22 for another. This sometimes meshes well with the amount of verbal production, but not systematically.

More interesting than the quantitative differences are the qualitative differences of the gestures across the different speakers. These differences reveal the individual speaker's "gestural idiolects", much like what Brannigan, in the domain of choreography, has termed a dancer's idiolect: "the corporal specificity of the dance star will be referred to as the performer's idiolect, their gestural idiolect" (2011:142). If co-verbal gestures are considered as fully integrated into communication acts, idiogests are to be expected. Some of the gestural variation concerns ad hoc individual preferences, much like a personal gesture style. However, our data shows that these idiogests are not always mere individual preferences but indicative of a certain semantic focus or perspective that the speaker takes on the scene. For example, one speaker's recurrent oscillating hand gesture reveals his overall semantic focus on the relationship between the entities on the picture. Another speaker's recurrent swaying of her hands reveals her overall focus on shape, and yet another speaker's repeated use of a sloppily defined pointing gesture reveals her maintained focus on the larger spatial lay-out. Strikingly, these idiogests recur in the descriptions of different pictures.

In sum, idiogests may consist of ad hoc individual differences, but they often also reveal the overall semantic perspective that the speaker takes on a given scene and maintains throughout the discourse.

Keywords: coverbal gestures, gestural idiolects, spatial descriptions





# Crossing roads between intersubjectivity in gesture and intergenerational interaction

Alysson Lepeut <sup>1</sup>, Catherine Bolly <sup>2</sup>

<sup>1</sup> Université Catholique de Louvain – Belgium <sup>2</sup> University of Cologne – Germany

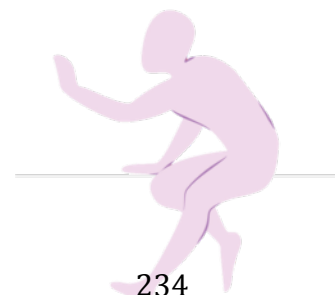
There is now some evidence that the study of gesture in aging is in need for research that can better reflect interaction as performed in real-world settings [1]. We argue that the use of gestures and gesture space enable intersubjectivity [2], viz. how speakers adjust their movements towards their addressee to bring him/her into the dialogue. Adopting a multimodal corpus approach, the overarching aim of the present study is to show the extent to which the degree of social familiarity [3] between a speaker and addressee will affect an older adult's production of interactive gestures [4, 5] and use of gesture space [6]. The data analysed are part of the CorpAGEst corpus [7], which comprises semi-directed, face- to-face video recorded interviews with very old healthy adults. For the current purposes, two 5-minute samples were selected, where Nadine (75 y. old) interacts with her daughter in a first interview and with a first acquaintance in a second interview, respectively.

First results show that Nadine produces a higher rate of gestures when speaking with the unfamiliar addressee than with the familiar one, and that interactive gestures represent the most frequent functional category in both samples (compared to ideational, expressive, and structuring gestures). Overall frequencies reveal that Nadine performs slightly more interactive gestures regulating her exchange with the unfamiliar than with the familiar addressee, suggesting that she uses more gestural devices to involve the unknown addressee into the conversation. Additionally, it appears that Nadine pays more attention to discourse cohesion with the stranger, while displaying more expressive cues with her daughter. Secondly, splitting up interactive gestures according to their respective function within the social context, the higher presence of self-adaptors with the first acquaintance suggests that Nadine feels more uncomfortable with the unknown person. Moreover, it seems that she experiences slightly more difficulties in processing speech and finding her words with her daughter than with the first acquaintance. Thirdly, the analyses of gesture space reveal that Nadine strongly favours the central areas of her personal space when performing interactive gestures, regardless of the addressee whereas she uses a wider gesture space with the unfamiliar addressee.

It seems difficult to provide a definitive explanation for the present findings. Yet, several possibilities will be addressed, including the role played by gestures in face management, the relation between speakers' empathic ability and their nonverbal behaviour, or the impact of personality traits and life experiences on self-disclosure in later life.

Altogether the present study brings the fields of gesture and aging a step closer to each other, especially by showing how previously neglected multimodal aspects of language can be efficient means for the speaker to manage social interaction.

Keywords: interaction, gesture space, interactive gesture, multimodal corpus, aging



# Repetition and reduction in silent gesture: Evidence from body tracking

Ryan Lepic, Dan Lenzen, Savithry Namboodiripad, Tessa Verhoef

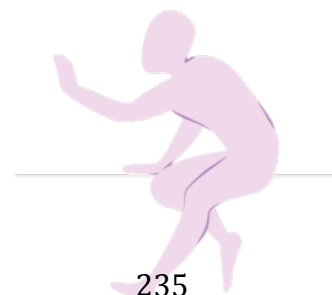
UC San Diego – United States

Gesture and sign language are “visible bodily actions” that are standardly used for human communication (Kendon 2008). We anticipate that, because they are both transmitted via the visual-gestural modality, sign and gesture should also have some formational properties in common (Kita, van Gijn, & van der Hulst 1998/2014, Gerwing & Bavelas 2004). Here we ask whether changes in form that have been shown to affect lexical signs in sign language can also be observed in elicited silent gestures in a laboratory context. We present body-tracking data from repeated tokens of gestures in a laboratory setting to show that participants’ gestures reduce in systematic ways. Namely, here we develop an operational measure for distalization, the transference of bodily movement to more distal joints (Napoli, Sanders, & Wright 2014), and demonstrate that it is possible to observe and measure distalization in ad hoc gestures as they are repeated over the course of a gesture game.

Following Namboodiripad et al. (2015), we used the Microsoft Kinect to track the movements of players in a multi-round communication game. The goal of the game was for pairs of players to successfully communicate about items from a set of 32 English nouns. Players took turns either giving clues about (the Communicator) or guessing (the Guesser) the items. In Round 1, the Communicator could use speech and co- speech gesture, but Rounds 2-4 were silent gesture-only. All items appeared in each round, and we found that over the course of the game, players converged on a set of gestural labels to refer to the target items.

From the gesture-only rounds, we measured the volume of the space that each of six joints (the right and left wrists, elbows, and shoulders) occupied during each item trial for each participant. We assumed that if the volume associated with a given joint during an item trial decreased between rounds, then the joint was moving less over the course of the communication game. Indeed, the volume occupied by each of the six joints per item trial decreased across rounds. In addition, there was a significant interaction of round and joint ( $p=0.013$ ); the more distal joints decreased in volume less dramatically than the more proximal joints did. This suggests that the distribution of movement in a given gesture trial skewed towards more distal joints as the experiment progressed, our operational metric for the process of distalization. With Kinect, we have a new tool to unobtrusively measure visible bodily actions produced in an experimental context. Here we have used this tool to assess a relatively fine-grained aspect of gesture form which has been previously described as a component of ontogenetic development and synchronic reduction, both in gesture and in sign.

Keywords: silent gesture, communication game, body tracking, reduction



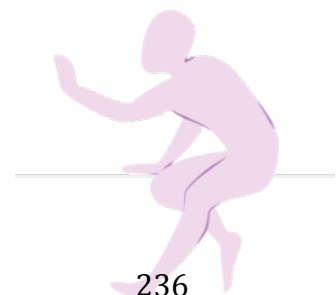
# The Function of Interpersonal Touch in Mandarin Chinese Interaction

Xiaoting Li

University of Alberta – Canada

Our social interaction is constructed by semiotic resources of multiple modalities such as syntax, prosody, gesture, gaze etc. Although these multimodal resources work together in forming talk and actions, each of them has its own organization. While the role of some resources such as syntax, prosody, gesture, and gaze has been extensively discussed in Interactional Linguistics, Conversation Analysis, and gesture studies, interpersonal touch (henceforth touch) in everyday interaction has been mostly neglected. Most research on touch has focused on its function in evoking affects and feelings (e.g. Johnson and Johnson, 1993), increasing intimacy (e.g., Jones and Yarbrough, 1985), and soliciting people's helping behaviors (e.g., Gue'guen and Fisher-Lokou 2003). Adopting the methodology of Conversation Analysis, Interactional Linguistics, and Multimodal Analysis, this paper explores the interactional function of touch in everyday Mandarin conversation. The data for this study are 8 hours of video recordings of everyday Mandarin face-to-face conversation. A cursory examination of the data shows that touch may be used to implement different interactional tasks in different sequential and situational environments. First, interactants may have different treatment of the ongoing talk and deploy touch to compete for the floor and regulate turns. Second, in question-answer sequences, touch is used by the questioner to seek affiliative responses from the addressed recipient. Third, touch also seems to be used as a tactical attention-getter at the beginning of a sequence and/or topic. That is, the speaker may touch the recipient at the beginning of a sequence/topic to indicate the beginning of something new and seek the recipient's attentiveness to the ensuing talk. It should be noted that the occurrence and performance of touching behaviors in the data are related to the particular spatial and orientational arrangements of the interactants' bodies. Touch also works together with other semiotic resources in the formation of talk and actions in Mandarin face-to-face interaction. This study contributes to our understanding of the role of the under-studied bodily conduct of touch in everyday Mandarin conversation as well as the linguistic and cultural diversity in the use of touch.

Keywords: interpersonal touch, Mandarin conversation, multimodal resources, turn regulation, seeking affiliation



# The Voice and the Body of the English as a Foreign Language Teacher: Descriptive Study of Teacher Trainees' Speech and Gestures in a University Context

Andrea Lizasoain <sup>1</sup>, Amalia Ortiz De Z'arate <sup>1</sup>, Katherina Walper G <sup>1,2</sup>, Evelyn Catrip'an <sup>3</sup>, Jazm'in Sepu'lveda <sup>3</sup>

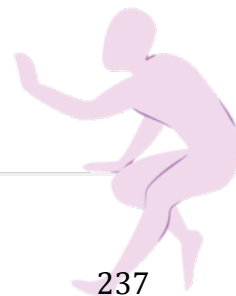
<sup>1</sup> Instituto de Lingüística y Literatura, Universidad Austral de Chile (UACH) – Chile <sup>2</sup> Centre for Advanced Studies in Language and Communication (CASLC, UoY) – United Kingdom <sup>3</sup> Pedagogía en Comunicación en Lengua Inglesa, Universidad Austral de Chile (UACH) – Chile

The use of the body as a teaching tool (Hamp-Lyons 1981) usually constitutes a challenge for teachers of English as a Foreign Language in Chile. By the same token, nonverbal communication (NVC) has been understudied for years in the Chilean classrooms (García Hormazabal 2013). These are the main motivations behind the project English Acting out Language (Lizasoain et al. 2012) which was established in 2008 to enhance the teaching of the foreign language in the South of Chile through the use of drama techniques. This presentation will show the main results obtained in one of the latest stages of the project: simulated literature lessons carried out by junior teacher trainees. Researchers sought to diagnose students' communicative competencies (Bagaric and Mihaljevi 2007) as well as their use of their bodies in interaction in order to identify needs for training. This study analyses the kinds of gestures (McNeill 1992) that accompany oral texts produced by three EFL students with different proficiency levels: low, intermediate, advanced. Students were in charge of designing and testing communicative activities to teach English through one of the literary pieces of work included in the literature module. These activities were then tested with their own classmates acting as students. Data was coded using an ad hoc grid which comprised transliterations of speech accompanied by the corresponding images of the gestures produced. The most significant instances of gesture production were re-played to the three subjects of this study during an interview in which researchers examined their degree of awareness of the use of their own bodies while teaching.

Data showed that the most common oral texts were instructions and explanations, which were produced together with repetitive iconic (Tabenski 2004) and deictic gestures to secure the attention of the students (Gullberg and Kita 2009), clarify meaning, provide feedback (Lyster and Ranta 1997) and regulate behavior. It was also found that there is a correlation between kinds of texts, types of gestures and students' proficiency levels: those with higher proficiency levels were able to produce gestures that enhanced the meaning of the verbal message, whereas those with lower levels used gestures as a way to compensate and cope with the communicative process and the pedagogical goals of the lesson.

Finally, videos and interviews evidenced that trainees are not aware of their own nonverbal resources (Liew 2013) which, at the same time, has an impact on their performance. This urges training in this area, since it can help the performance of a teacher in the classroom as well as benefit or hinder the teaching- learning-assessment process (Iverson, Jana M. & Goldin-Meadow 2005).

Keywords: teaching, Chile, gestures, English as a Foreign Language, communicative competence



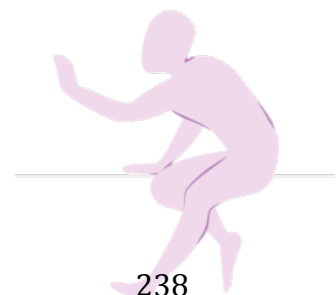
# Group Work in ESL Classrooms: How Learners Accomplish Alignment and Affiliation through Gestures

Carol Hoi Yee Lo

Teachers College, Columbia University (USA) (TC CU) – United States

This paper focuses on the role of gestures in helping language learners establish alignment and affiliation in group discussion. It is not uncommon to observe how second language learners with low or intermediate proficiency fail to understand one another when working in groups. Moreover, given that many ESL classes feature learners from diverse cultural backgrounds, developing rapport could be challenging when lower level students work in groups. How do learners, given their limited linguistic resources, understand their peers and try to be understood by their peers? Drawing on data from video and audio recordings of group work in three different ESL classes offered by a university in the US, the present study examines how ESL learners use gestures to accomplish (re)alignment when the group discussion faces an interactional impasse as a result of a lack of understanding or misunderstanding. It also sets out to understand the role of gestures in helping learners build rapport with their group members. Instances of establishing alignment and affiliation will be analyzed from both conversation analytic and interactional sociolinguistic perspectives. Analysis show that gestures are used (1) to establish alignment by clarifying unclear referents, especially when the lack of vocabulary impedes communication, (2) to build rapport and affiliation by signaling a play frame, and (3) to display understanding to both further align and affiliate. The study provides empirical evidence for role of gestures in collaborative learning between language learners and cross-cultural communication and informs ESL practitioners how lower level learners resolve communication problems and establish rapport.

Keywords: alignment, affiliation, group work, collaborative learning, ESL



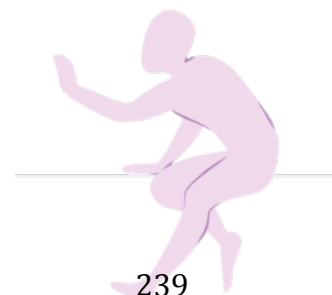
# Speech-accompanying Gestures of Saudi Arabic Speakers and British English Speakers: A Cross-cultural Study

Alsubhi Mai, Sotaro Kita, Jeannette Littlemore

University of Birmingham: School of English, Drama, American and Canadian Studies – Edgbaston  
Birmingham B15 2TT United Kingdom, United Kingdom

People from different backgrounds gesture differently. Their gestures differ in terms of features such as degree of their complexity (Efron 1972, Kendon 2004), body parts involved in performing them (Efron 1972), their size (Kendon 2004) and referring to to-the-right and to-the-left relations (Kita, Danziger & Stolz 2001). According to previous studies, those differences might be caused by the ecological effect (Kendon 2004), cognition of space (Kita, Danziger & Stolz 2001), social norms (Kita and Essegbey 2001) and the semantic and grammatical spoken language structure (Kita and Özyürek 2003). However, Arabic speakers' manual speech-accompanying gestures have not been examined in such a cross-cultural study nor have those gesture features been looked at. Therefore, this paper investigates the cross-cultural differences between gestures accompanying speech produced by British speakers of English and Saudi speakers of Arabic regarding features of gesture space, frequency of gestures per minute and types of gestures used. 16 British speakers of English and 16 Saudi speakers of Arabic described the movements of the characters in 10 small action event movie clips of *Tomato Man* (Özyürek, Allen, & Kita, 2001; Özyürek et al., 2007, Kita, et al., 2008). They also answered questions on 3 short stories of social dilemmas after reading them such as what they would do if they were in the characters' situations (adapted from Chu, Meyers, Foulkes & Kita 2013). Quantitative and Qualitative analyses of the data revealed the following results. I found that Saudi participants used significantly bigger gesture space when they gesture than the gesture space used by British participants. Saudi speakers of Arabic also used a higher rate of gestures per minute than those produced by British speakers of English per minute. These findings are to an extent similar to how the Neapolitans' speech-accompanying gestures are like in the study conducted by Kendon (2004). Moreover, Saudi participants were likely to employ more than one type of gesture such as representational and beat gestures within a clause whereas British participants were more likely to employ not more than one gesture type within a clause. Causes of such cross-cultural differences are discussed. This cross-cultural study has been established as a base line in order to conduct another study that investigates the general features of speech-accompanying gestures of second language learners.

Keywords: cross, cultural, L1 Arabic, L1 English, gesture space, gesture frequency, gesture type





# Gestures as indicators of differing cognitive strategies to approach mathematical problems

Paola Marchant

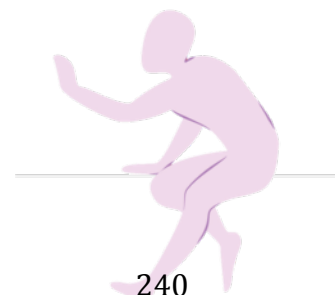
Pontificia Universidad Católica de Chile (Educación) (PUC) – Vicuña Mackenna Oriente 4460, Santiago, Chile

In the last decades research has evidenced that spontaneous gestures play a role in the teaching and learning of mathematics (Allibali & Nathan, 2012; Goldin-Meadow, 2006; Novack et al., 2014). A question which remains open is how gestural function in learning relates with other cognitive-educational variables, such as cognitive styles and cognitive strategies. The present study inquires whether analytical or holistical strategies to solve mathematical problems (Ispir, Ay & Saygi, 2011; Hunt & Ellis, 2007; Radford & André, 2009) are differently expressed through gestures. The study was conducted using a mixed methods design (Creswell & Plano, 2007). A total of 61 undergraduates who were studying in their first semester at university (34 from literature studies; 27 from engineering) were video recorded while solving five mathematical problems. Gestures, written and oral productions were analyzed and assessed using rubrics.

The results show that most students chose an analytical style to solve mathematical problems rather than an holistic one. Engineering students have higher score on the analytical scale, differing from humanities students ( $t(59)=3,243$ ;  $p=.002$ ). Within the analytical style, Gesture analysis allows distinguishing two styles of approaching mathematical problems: the "Analytical Restricted"; and the "Analytical Expanded". The "Analytical Restricted" style expresses weak involvement with the task and a logical problem-solving mode focused on elements of the situation and the relations among them. In this style, students tend to use only one hand, using deictic or pointing gestures, which might reflect the grounding of cognition in the physical environment (Alibali et al., 2014). The "Analytical Expanded" style is characterized by controlled, resolute gestures, with rapid, defined and precise movements. It reflects a direct relation of thinking with the environment in which it happens (Alibali et al., 2014). Their discourse is strong, fast and continuous; participants deploy confidence in both the procedure explanation and the result. Interestingly, both styles are consistent with the performance of each group in the mathematical situations. As a group, engineering students scored the highest in the tests, and they were more likely to use an "Analytical Expanded" style to solve mathematical situation.

The distinction between these styles helps to understand how gestures are expressed when solving mathematical situations. Therefore, gestures can be used to identify different engagement styles and problem-solving strategies (Yoon et al., 2011). Although it has been argued that gestures tend to diminish when word-language increases (Bernardis & Gentilucci, 2006; Capone & McGregor, 2004), the study reveals that to a higher degree of expertise in mathematics, the gesture is not only present, but also takes on a role of importance as a communication tool, to accompany the speech and shaping understanding (Goldin-Meadow et al., 2003; MacNeill, 1992).

Keywords: Gesture, Cognitive Strategies, Mathematics



# Gesture Frequency is Linked to Storytelling Style: Evidence from Bilinguals

Paula Marentette<sup>1</sup>, Elena Nicoladis<sup>1</sup>, Jaya Nagpal<sup>2</sup>

<sup>1</sup> University of Alberta– Augustana Campus – Canada <sup>2</sup> Grand Valley State University – United States

Some studies have shown differences between languages/cultures in gesture frequency. For example, So (2010) showed that English-speaking Americans gestured more frequently than Chinese. So (2010) attributed this difference to cultural values placed on gesturing, with Chinese culture discouraging gestures. However, not all studies have shown the same patterns of results across the same cultural groups. For example, another study showed no differences between English monolinguals and Chinese monolinguals in gesture frequency (Nicoladis, Pika, Yin, & Marentette, 2007).

One way to reconcile the differing results is that culture may not impact gesture frequency directly. Instead, it is possible that the style of speech may mediate the effects of culture. The purpose of the present study was to test whether gesture frequency might be linked with story-telling style.

Previous research has suggested that there may be individual and cross-cultural differences in storytelling style, with preferences toward telling a chronicle (what happened and how it happened) or an evaluative story (what happened and why it happened). Tannen (1980) showed that Americans were more likely to use a chronicle style while Greeks used an evaluative style. A chronicle style relies on recounting vivid visuo-spatial images, a style that could be linked with a high use of representational gestures, since they may reflect visuo-spatial processing (Alibali, 2004). We expected representational gestures to be linked with a chronicle storytelling style.

The participants of this study were all bilingual, with English as their second language, learned fluently post-adolescence. Their first language (L1) was one of Mandarin Chinese, Hindi, French, or Spanish. All participants watched a cartoon and told the story back, once in English and once in their L1. We videotaped the participants as they told their stories. Their speech was then transcribed orthographically (with attention to how to account for cross-linguistic differences in morphology). We coded for participants' use of representational gestures. To control for differences in story length, we calculated a gesture rate, the number of gestures divided by 100 word tokens.

The results showed cultural differences in the rate of gesture use, with the Chinese and Hindi L1 participants gesturing less frequently than the French and Spanish L1 participants. The Asian participants were more likely to tell an evaluative story (following coding from Tannen, 1980), using a lot of adjectives and adverbs, inferring characters' emotions and sometimes even telling the moral of the story. The Romance-language participants tended to describe what actions had occurred.

We conclude that when a chronicle style is elicits more numerous gestures than an evaluative style. These results are consistent with the argument that culture does not impact directly on how frequently people gesture. Instead, culture impacts the style of speaking people adopt which, in turn affects their gesture frequency.

Keywords: cross, cultural differences, gesture frequency, discourse style



# Spatial Metaphors Underlie Gesture in Musical Conducting

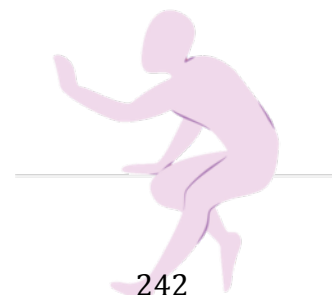
Amanda Masterson, Bodo Winter, Teenie Matlock

University of California, Merced, Cognitive and Information Sciences (UC Merced) – United States

Gesture is a key part of conducting music. In directing the performance of a musical piece, the conductor primarily uses the dominant hand (often right) to express beat and tempo (Rudolf, 1980), and the non-dominant hand to express other aspects of music, for instance, amplitude. An interesting and understudied part of this process is how the conductor dynamically interprets the semantics of the music itself and how that is realized in gesture form. This study examines the dynamics of the non-dominant hand, especially how conductors express amplitude and how it is similar to co-speech gestures of quantity (Winter, Perlman, & Matlock, 2013). In our study, we analyzed 100 YouTube videos of live performances of Beethoven's Fifth Symphony. We chose this popular piece because it would enable us to analyze gesture across a large number of conductors. In our analysis, we coded the first 8 measures of the piece, which shows a noticeable shift from forte (loud) to piano (quiet). Our statistical analysis showed that open-handed gestures were far more likely to occur with the palm pointing upward during the forte section than during the piano section. In the piano section, we observed that a large majority of conductors used a downward palm gesture (see Fig. 1a), but we also observed many precision grips (see Fig. 1b). In the first three measures, many conductors also closed the non-dominant hand and formed a fist, and even more transitioned from that fist hand shape into an upper-oriented palm hand shape. Our analysis also looked at "cut-off gestures" (hands to indicate an abrupt halt), and found that these were more likely to occur at the transition from forte to piano than they were between two sub-parts of the forte section, showing how conductors use those gestures to discern major loudness transitions.

We interpret the conductors' gestures in terms of recent work on the palm-up open hand gesture family (Müller, 2004) and work on precision grip gestures (Kendon, 2004, Ch. 12). We look at how differences in gestures (e.g., fist versus open hand) relates to differences in how the music piece is performed. Importantly, the metaphorical gestures used by conductors correspond to co-speech gestures used outside conducting (cf. Br' am & Boyes Braem, 2000). For example, the upward or downward orientation of the palm is mapped onto "more" or "less" loudness, similar to gestures that are used when talking about "high" or "low" numbers (Winter et al., 2013). Similarly, precision grips map onto small amplitudes. Thus, although music is not inherently spatial, metaphorical gestures form a way of spatializing aspects of music, such as loudness.

Keywords: metaphorical gestures, gestures in music, iconic gestures



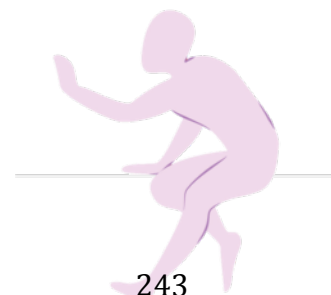
# Gesturing inhibits memory of concrete subjects when it is taboo

Krista Matthews Saugstad, Erik Raymakers, Damian Kelty-Stephen

Grinnell College (GC) – 1115 8th Ave Grinnell, IA 50112, United States

Hand gestures are an important use of social space to embody cognition across our bodily movement in a way that supports ability (Orton, 2007) and memory for linguistic communication (Frick-Horbury & Guttettag, 1998; Klooster et al., 2015). We sought to explore how the effect of gestures might proceed under constraints both linguistic and social in a game modeled after "Taboo." 40 adult participants from Grinnell College attempted to communicate a target word on each card in a deck. Words were categorized as either concrete or abstract and as either easy or difficult (i.e., based on set size), each word type grouped within the deck. The linguistic constraint was our imposition of forbidden "taboo" words. The social constraint was the prohibition, in half of the trials. Participants held word cards in their non-dominant hand, and we recorded accelerometry of dominant-hand gestures using a Texas Instruments SensorTag. Gesture data was analyzed by calculating the average unsigned change in triaxial acceleration for the duration a participant described the set of words in each word type group. After the completion of both rounds participants listed as many words as they could freely recall describing within two minutes. Using logistic regression of whether or not participants recalled target words, we found significant main effects for word concreteness ( $B = -.66$ ,  $SE = .21$ ), permission to gesture ( $B = -1.90$ ,  $SE = .77$ ) and amount of gesturing ( $B = -12.94$ ,  $SE = 6.30$ ), and significant effects of the interactions for permission\*amount of gesture ( $B = 10.37$ ,  $SE = 5.19$ ), for permission\*concreteness ( $B = .38$ ,  $SE = .13$ ), for amount of gesture\*concreteness ( $B = 2.64$ ,  $SE = 1.13$ ), and an interaction for permission\*amount of gesture\*concreteness ( $B = -2.14$ ,  $SE = .95$ ). When allowed to gesture and whether or not they actually gestured, participants remembered more words than when instructed to not gesture and were more likely to remember abstract words than concrete words. When instructed to refrain from gesturing and if they succeeded in doing so, participants remembered an equal number of abstract and concrete words. Prohibited gestures diminished later memory for concrete words, leaving better memory for relatively abstract words. Hand gestures may help us recall exactly those words about tangible things we might lay our hands on but that social pressure to not gesture may reverse this effect, leading us to forget those concrete topics we have made greater gestures to communicate. Hence, future work on embodied cognition may need to wrestle with the challenge that, on one hand, gestures may enlist bodily movements to support the internalization of information for later memory but, on the other hand, this overt gesturing may pave the way for public, social constraints to intervene in private cognitive processing.

Keywords: embodied cognition, memory, concrete, abstract



# Gesture and information flow in children's explanations: an explorative study

Audrey Mazur-Palandre <sup>1,2</sup>, Kristine Lund <sup>1</sup>

<sup>1</sup> ICAR (Interaction, Corpus, Apprentissages, Représentations) – Université Lumière - Lyon II, ENS Lyon – France <sup>2</sup> Laboratoire d'Excellence ASLAN (Advanced Studies on LAnguage complexity) – France

This paper investigates the relationship between information flow and gesture production of 6-year old French children during "how" explanations. Information flow is the evolution of the status of information in an ongoing conversation, and more specifically the modification of the syntactic form and the cognitive status of referents having to do with the new/given information (Chafe, 1994). Previous studies show that speaker's grammatical choices are linked to the informational status of the referent (Du Bois, 1989, 2003; author, 2015). Language is governed by four constraints linking syntactic and pragmatic aspects: 1) One lexical NP per clause; 2) A non-lexical subject/agent role; 3) One new element per clause and 4) Old information in subject position. These reflect the principles of information transmission and represent the natural organisation of arguments in spoken languages (Du Bois, 1989).

Given that gesture and speech constitute a common system (e.g. Kendon, 2000; McNeill, 1992, 2000) and that gestures encode spatio-motoric representations of a referent and also structure this information so that it is compatible with linguistic constraints (e.g. Kita, 2000; Kita & Özyürek, 2003), we propose to study how children's gesture can be influenced by information flow.

Chui (2005) showed that adult Chinese speakers tend to perform iconic gestures more for new information than for old information. Kumpf (2002) analyzed information flow, grammatical structure and gesture together and concluded that these three aspects of discourse "work together to realize the management of information in the classroom" (Kumpf, 2002:403).

We analyzed children's productions to see: a) if children's gestures are associated with information flow; and b) if the informational status of a referent influences gesture choices like it influences grammatical form, as is the case for adult speakers.

Sixty participants played two on-line educational games (one concerning numbers and the second concerning spatial dexterity), in dyads. In phase 1, a child-instructor played the game alone. In phase 2, the child-instructor explained the game to a peer. In phase 3, the child-learner played the game. This study focuses on phase 2, also studied from the influence of contextual elements

\*Speaker

---

(cf. authors, 2015; authors, forthcoming).

Initial analyses reveal that: a) new information is encoded by a lexical NP in a non subject position and the majority is carried out with concrete gestures; b) whereas old information is encoded by a pronoun in subject position and call less frequently a gesture. If these results are confirmed by complementary analyses, we can: a) think that gesture and speech production are an integrated system and b) complete the theory of Du Bois by adding gesture.

A larger study, in a developmental perspective is planned. This will allow us to generalize our findings and confirm the addition of gesture to Du Bois' theory.

Keywords: children language acquisition, gesture, information flow



# Instruction at the Ballet Barre: Movement, Embodiment, and Gesture

Steven Mccafferty<sup>1</sup>, Kimi Nakatsukasa<sup>2,3</sup>

<sup>1</sup> University of Nevada, Las Vegas (UNLV) – NLV Department of Educational Psychology Higher Education Carlson Education Building Department Office CEB 320 4505 S. Maryland Parkway Box 453003 Las Vegas, NV. 89154-3003, United States <sup>2</sup> Texas Tech University – Department of Classical and Modern Languages and Literatures Box 42071 Lubbock, TX 79409-2071 USA, United States <sup>3</sup> Ritsumeikan University – Department of Comprehensive Psychology 2-150 Iwakura-cho, Ibaraki, Osaka 567-8570 JAPAN, Japan

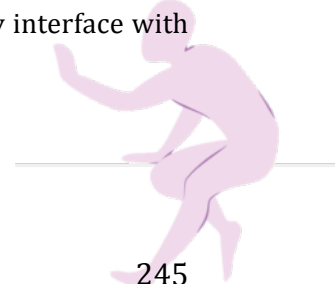
Gestures are known to be highly contextual (McNeil, 2012); however, not many studies have investigated how embodiment and gestures interact in a context where an embodied movement itself functions as instructional language as observed during a dance class (but see Stevens & McKenchnie, 2005). This study investigated how a classical ballet instructor for the Royal Ballet Company used instructional embodiment and hand gestures with a large group of professional dancers while doing barre work (a stationary handrail that provides support). We used data from a video-recorded session and analyzed it on Elan software in order to better understand how the instructor uses embodiment and stylized gestures to convey a sequence of codified ballet movements and to instill memory of them.

Ballet dancers use the barre for balance and watch themselves in the mirror to fine tune and synchronize upper- and lower-body movements. This is an important initial session before dancers engage in sequences on the floor. Previous studies showed that dancers' memory of movements is tied to music (Kimmerle & Cote-Laurence, 2003) which accompanies in the barre work after initial instruction, and that neural mirroring, which experienced dancers go through while viewing familiar movements (Calvo-Merino, Glaser, Grezes-Passingham, & Haggard, 2004), also facilitates memorizing a sequence.

Each instructional segment at the barre consisted of two basic phases: an embodied modeling and then hand gesture modeling. Some of the key characteristics identified in the first phase were (a) use of a "sing-song" vocalization (representing the music, not played) including the name and directionality of movements, (b) performance of all of the movements and transitions of the sequence to the tempo of the music (again, not played), (c) fully-enacted lower body movements with less enacted or abbreviated upper body movements, (d) use of hand gestures to represent movements, transitions, and foot shape. In the second phase, key characteristics were (a) no reference to the music and (b) extensive use of hand gestures. Also, at the end of the first phase, in order to enhance memory, the dancers "marked" (traced) the sequence on their hands and/or legs, or stood still, likely imaging the sequence.

Our discussion focuses on how the instructor's movements and gestures modeled form and instantiated a given sequence in memory, which is in line with previous studies which mention that simulating action via embodiment and gestures functions as non-verbal communication between dancers and choreographer (e.g. Foster 1976; Glass 2005; Malloch 2005). Our analysis also confirms the advanced dancers' reliance on their own 'intrinsic' feedback through reflecting on their movements in the mirror (Kimmerle & Cote-Laurence, 2003). Furthermore, we add to the research by examining the abbreviated movements and hand gestures and how they interface with instruction. Video clips will be shown.

Keywords: ballet, barre, movement, instruction, gesture, embodiment





# Finger tutting: Analyses of illusion-based finger dancing

Leland McCreary<sup>1</sup>, Julius Hassemer<sup>1,2</sup>

<sup>1</sup>Universidade de Sao Paulo, Faculdade de Filosofia, Letras e Ciências Humanas – Brazil <sup>2</sup>Research Fellowship 2016-2017 - German Research Foundation, DFG – Germany

Finger tutting is a recently-emerging underground urban dance style popularised on video sharing platforms that depends on rapid precision movements of the arms, hands and fingers to produce visual effects, typically accompanied by hip hop music. It incorporates various b-boying techniques (e.g., waving, popping), but in a spatially condensed fashion. Within the last years, its popularity has increased by finger tutters appearing prominently in music videos and TV advertisements.

According to Maranan and associates (Maranan, 2012; Maranan et al, 2013), interactive arts and technology scholars, this and related dance styles are illusion-based, in that they create, through movement, the illusion of "a virtual environment that contains invisible, mutable objects and structures" (2013: 165). This is achieved, according to the authors, through means used by dancers to "leverage visual and spatial cognition principles for the purposes of creating specific perceptual impressions on the viewer" (2013: 168), tapping a cognitive process they call Structure Illusion from Embodied Motion (SIEM).

Developed independently within the field of gesture studies, Gesture Form Analysis (GFA), is a novel approach to the description gestures in terms of the cognitive operations on geometric forms required for their interpretation (Hassemer, in prep.; Hassemer et al, 2011), as opposed to only their articulatory formations. In GFA, handshapes, orientations and movements are suggestive of abstract topological dimensions (point, line, plane, solid) and systematic operations on them.

We will show how a Gesture Form analysis of examples of finger tutting informs the relations between the dancers' handshapes, orientations and movements and the illusory structures which are their intended interpretants. At the same time, the presentation will thus demonstrate how both interdisciplinary sources (e.g., cognitive dance studies) and lay sources (practitioners' accounts) corroborate the principles underlying Gesture Form Analysis.

## References

Hassemer, J. (in prep.). Towards a Theory of Gesture Form Analysis. Imaginary forms in gesture conceptualisation, with empirical support from motion-capture data. Dissertation, RWTH Aachen University.

Hassemer, J., Joue, G., Willmes, K., & Mittelberg, I. (2011). Dimensions and mechanisms of form constitution: Towards a formal description of gestures. In *Proceedings of Gesture and Speech in Interaction (GESPIN) 2011*. Bielefeld.

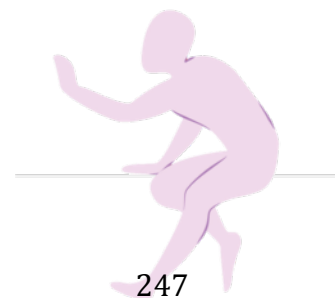
Maranan, D. S. (2012). *Dance Illusioning the Cyborg: Technological Themes in the Movement Practices and Audience Perception of Three Urban Dance Styles* by. Dissertation, Simon Fraser University.

Maranan, D. S., Schiphorst, T., Bartram, L., & Hwang, A. (2013). Expressing technological metaphors in dance using structural illusion from embodied motion. In *Proceedings of the 9th ACM Conference on Creativity & Cognition* (pp. 165–174). Sydney.

\* Both authors contributed to this paper equally. This work is supported in part by DFG grant HA7711/1.

## Talks

Keywords: finger tutting, gesture form



# Gestures, Grunts and Words: The Transition to Communicative Competence

Lorraine McCune

Rutgers University (RU) – 10 Seminary Place, New Brunswick, NJ 08901, United States

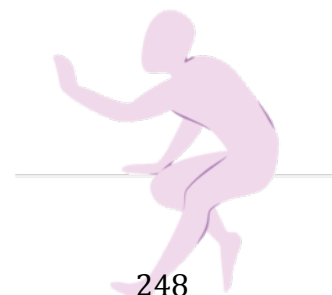
Fruitful studies of the relationship between gesture and language have addressed symbolic gestures and conventional words, as well as the integration of these modalities in infants' communicative acts. McCune et al. (1996) and McCune (2008) presented findings that communicative grunts were used communicatively across the infants they studied, prior to referential word use, and that grunt onset predicted the transition to reference. We were challenged to demonstrate that the "grunt effect" was not merely an effect of accompanying gestures. This research addresses both gesture and communicative grunt in infants' transition to language, providing an integrated investigation of their role.

Prelinguistic vocalizations, gestures, and language of five infants (9-16 months, including early and later talkers) in monthly play interaction with their mothers were analyzed to determine communicative function for gestures and order of emergence, frequency and observed co- occurrence of all communicative forms, both vocal and gestural.

Developmental trends were seen in the earlier occurrence of pointing, followed by higher frequency of extending. Communicative goals emerged in the order: pure interaction, request, information expression. Both pointing and extending were observed from early in the observation period, while communicative grunts emerged later, at 13-16 months, following the observation of early symbolic play.

Communicative grunts first occurred in events without gestures, demonstrating the independent communicative potential of these modalities. Events combining grunt with gesture were observed in the following month; both modalities continued in use together and independently throughout the study. Previous research had demonstrated that onset of communicative grunts predicted both the shift to referential language and, for early talkers, a sharp increase in word frequency. In the present study communicative grunt onset was followed by a sharp increase in frequency for both gestures and words, further demonstrating the significance of this vocal form.

Keywords: representational play, gesture, grunt, words



# Hands-on science: The benefits of hand gestures during science instruction

Lynley Mclay, Deirdre Brown, Karen Salmon

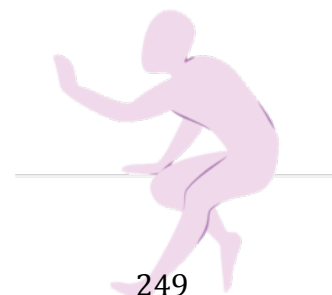
Victoria University of Wellington – PO Box 600 Wellington 6140 NEW ZEALAND, New Zealand

Gestures play an important role in facilitating children's understanding and remembering of new information (e.g. Cook, Duffy & Fenn, 2013). Science teaching may be particularly enhanced by the presence of hand gestures. Gestures aid the comprehension of abstract ideas, which form the cornerstone of science instruction, and their visual nature means that spatial content can be succinctly conveyed and easily understood. In the current study we examined the benefits for children when they observed gesture during a solar system lesson, as well as produced gesture when recalling the lesson at short and long delays. Participating children (7-10 years of age) were taught individually about the solar system either with or without hand gestures. Children were then interviewed both the next day (time 1) and 7 months later (time 2) to assess their understanding and memory of the information taught. The spontaneous gestures children produced during these interviews were coded.

Results from time 1 showed that observing gesture during learning did not predict children's recall and understanding of the solar system. Children who had observed gesture in the event did however, produce more gestures in the time 1 interview that were similar to the gestures they had observed. These replicating gestures were then associated with greater recall of the solar system and significantly mediated the relationship between observing gesture at learning and later recall and understanding of the event. In comparison, observing gesture had no influence on children's verbal recall or gesture production during the time 2 interview. The representational gestures produced during the time 2 interview however, were associated with greater recall at time 2. Therefore, the gestures children produce are associated with greater recall, both at long and short delays. Observing gesture improved recall at the short delay, but only through encouraging the children to gesture in helpful ways.

Our second study controlled gesture production during the interview, to more systematically examine the relationship between, and benefits of, observing gesture at learning and producing gesture at recall. A new sample of children (7-9 years of age) were taught about the solar system, with or without accompanying gesture, and were interviewed about the lesson the next day. During this interview children were either instructed to gesture, restricted from gesturing, or were given no explicit instruction about gesture. Data collection has been completed, with data being processed for analysis. The results from both studies will be presented and the implications from all findings will be discussed in terms of how and when gesture best supports learning.

Keywords: Teaching, hand gesture, learning, science, children, memory



# Poetic gestures: Jakobson's speech functions and their hierarchized modulation in multimodal performance acts

Irene Mittelberg<sup>1</sup>, Linda Waugh<sup>2</sup>

<sup>1</sup> Rheinische-Westfälische Technische Hochschule (RWTH) – RWTH Aachen Theaterplatz 4 52056 Aachen, Germany <sup>2</sup> University of Arizona – United States

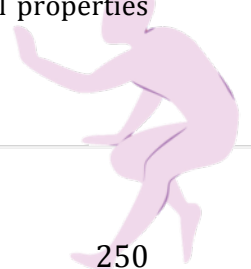
In this paper, we apply Roman Jakobson's (1960) six speech functions to multimodal performances combining speech, manual gestures and other movements. Our goal is to show how Jakobson's model allows for a fine-grained account of the multifaceted dimensions interacting in verbal and bodily signs jointly emerging in time and space. With the speaker/performer taking center stage, 'multimodal performance acts' here are understood as encompassing a variety of articulations and interactions, including, e.g., conversational exchanges, narrations, teaching, and architectural design practices. Human actors also are 'on stage' – whether literally or metaphorically – during a conversational turn or narrative. When expressing themselves or portraying someone else, 'performers' creatively modulate their semiotic acts regarding the extent to which they convey subjective and dramatic aspects (Brandt 2006), or what Johnson (2007) calls 'felt qualities' of experience, meaning and understanding.

Jakobson's (1960, 1990) schema includes six factors assumed to be constitutive of any given verbal message, and six corresponding functions of spoken or written texts. Depending on the prominent function of a given message-sign, one of the functions typically comes to the fore: emotive, conative, referential, poetic (aesthetic), metalingual or phatic. In line with Peirce (1955), Jakobson emphasizes that each speech event is characterized by the predominant function and how the remaining functions are related to each other through hierarchical ordering. Crucially, while the poetic function is the dominant function of verbal art, it may also be present in any other kind of verbal activity (Author 2 1980).

Taking these ideas into the realm of multimodality, a multimodal performance act qualifies as poetic or aesthetic if its formal, structural or material properties, rather than reference to external states of affairs, are of primary concern. Personifying 'poetic stance', performance artists tend to devote great care to formal and aesthetic aspects of their physical presence, movement and expression. In comparison, coverbal gestures employed in casual conversations are largely unconsciously produced multifunctional signs (Author 1 2011, 2013; Müller 1998). However, certain gestures are articulated with attention to their form, spatial extension, physical impetus, beauty or rhetorical effect (Cienki & Mittelberg 2013). Instilling expressive qualities that make them stand out in dynamic, multimodal, semiotic contextures increases the chances that addressees will notice them and the speaker's poetic stance (Authors 2009).

Particularly, we highlight how the poetic and emotive functions manifest themselves in everyday and artistic gestures that exhibit striking aesthetic and expressive qualities, both intramodally (e.g., through "catchments", McNeill 2005; Goss 2006) and cross-modally, for example, through salient instances in which speech and gestures or whole-body enactments are paralleled by showing similar expressive features in terms of prosody, rhythm, or other iconic and indexical properties that propel the poetic effect of the multimodal performance act as a whole.

Keywords: poetics, performance, multifunctionality



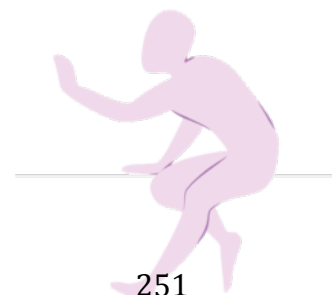
# Handle with care! Instructing the transportation and manipulation of pieces of art

Lorenza Mondada<sup>1,2</sup>

<sup>1</sup> University of Basel – Switzerland <sup>2</sup> University of Helsinki – Finland

The paper analyzes how instructions – conceived as requests to do something that specify how to do it – are situatedly produced and multimodally formatted in a specific setting, in which they deal with actions to be carefully done with delicate objects, for instance pieces of art. The paper is based on an extensive video recording of 5 days of work undertaken by a team in charge of re-assembling a monumental art installation in a museum. The installation is constituted by hundreds of pieces, each representing an object of art. At the beginning of the recording, the installation is disassembled in a series of big boxes. The team opens the boxes and reassembles the objects into a unique coherent and ordered monumental piece of art. On the basis of this unique video shooting, the paper draws on ethnomethodology and conversation analysis to explore issues related to the multimodal formatting of action, and to gestures specifically engaging with objects of art. These are handled in specific ways that address their specificity qua art pieces. Instructions produced and responded to within the team also orient to these specificities, even when they take very mundane and indexical forms, like "take this", "put that one there", etc. In this paper, I explore how the indexicality of instructions is implemented and intelligibly understood in this particular context, by workers handling objects with care, in a way that exhibits their exceptional, unique, esthetic quality. The analysis focuses on how the bodies, movements, and gestures of the workers are instructed in the course of the work, how instructed actions respond in an embodied way. Embodied instructions, directives and requests have been increasingly discussed in the interactionist literature (e.g. by Goodwin & Cekaite, Mondada, Lindwall, Deppermann, etc. – see f.i. lately the volume edited by Drew & Couper-Kuhlen, 2015). This paper elaborates on previous studies by focusing on the specificity of the setting: how are instructions transformed by adjusting to the particular and delicate nature of the requested action? How do complying actions respond to it? In particular, when the verbal instructions are not specifically designed, how are the embodied instructed actions specifically shaped, and also accordingly expected, corrected, adjusted? In this way, the paper addresses issues related to the embodied dimension of action, as well as to its indexicality – f.i. its specific adjustment to particular settings.

Keywords: conversation analysis, multimodality, instructions, requests, action formation, art object, art installation





# Modified Gesture Repeats in Aligned Transformative Responses

David Monteiro

University of Basel – Switzerland

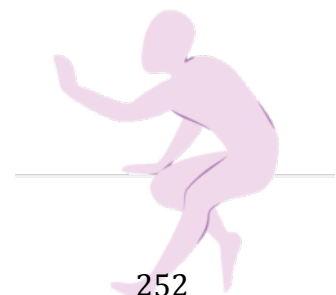
This study focuses on one practice whereby talk and gesture are methodically used by participants in social work service encounters in order to provide relevant information while ensuring the seamless progression of the interaction: repeating a gesture co-occurring with speech within a responsive turn, for displaying understanding of and alignment with the interlocutor's immediately prior turn. This practice will be presented systematically on the basis of a corpus of 17 hours of video recordings of social work encounters taking place in social solidarity institutions in Portugal; data is transcribed, annotated and analyzed within a conversation analytic framework in order to preserve the synchronized and coordinated temporality of talk, gesture and gaze of the participants (on multimodal transcription, see Mondada 2014). The presentation of the systematic organization of the practice of gestural repeats in responsive turns will provide the basis for a subsequent exploration of cases whereby a gesture produced by the interlocutor in the previous turn is modified (on modified repeats, see Stivers 2005; on transformative answers, see Stivers & Hayashi 2010) so to display alignment and understanding concerning the prior turn, while transforming the gesture (see Goodwin 2013) in order to change or challenge some aspect of the idea previously conveyed.

By focusing on participants' orientation to the local relevance of producing gesture in responsive environments, this presentation aims to explore the interactional use of gesture repeats for producing aligned responsive action, and of gesture modified repeats for challenging descriptions produced in prior turns by co-participants.

## References:

- Goodwin, C., 2013. 'The co-operative, transformative organization of human action and understanding'. *Journal of Pragmatics* 46, 8-23.
- Mondada, L., 2014. 'The local constitution of multimodal resources for social interaction'. *Journal of Pragmatics* 65, 137-156.
- Stivers, T., 2005. 'Modified Repeats: One Method for Asserting Primary Rights From Second Position'. *Research on Language and Social Interaction* 38(2), 131-158.
- Stivers, T. & Hayashi, M., 2010. 'Transformative answers: One way to resist a question's constraints'. *Language in Society* 39, 1-25.

Keywords: conversation analysis, multimodality, co, speech gesture, responsive action



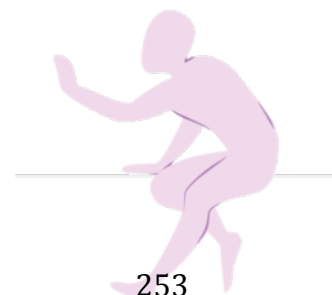
# Contrast-marking gestures in U.S. political rhetoric

Selene Nafisi, Erica Cartmill

University of California Los Angeles (UCLA) – United States

Gesture's role in political oratory has been noted for almost two millennia (Quintilian, 95). Recent work on political speech has demonstrated that the handedness and hand shape of politicians' gestures reflect the political positions they espouse in speech. Hand shape displays similarities across politicians, perhaps shaped by the ways it elicits audience responses (Streeck, 2008). The association between gesture use and position-taking is present in both micro- and macro-level analyses. Lempert (2011) found that Barack Obama uses a precision grip gesture to communicate both literal precision (in measurement) and metaphorical precision (in clarity of argument). Taking a broader approach, Casasanto and Jasmin (2010) found a correlation between presidential candidates' dominant hand use and positivity of speech. While these studies differ in granularity, they are similar in analyzing gesture first and then examining accompanying speech. This maximizes the gesture corpus, but can present difficulties in linking results to literature on political discourse. In this work, we connect gesture studies with studies of rhetorical devices in political speech (Atkinson, 1984). Rhetorical devices are the verbal constructions politicians use to elicit particular reactions from their audiences (Heritage and Greatbatch, 1986). For example, a politician might introduce her position by first setting up a problem to be solved and then revealing her solution (a 'puzzle-solution' device). Alternatively, she might describe her position in opposition to that of an opponent (a 'contrast' device). The same positions presented using different devices may result in different audience responses. We focus on contrasts because they occur frequently, have a clear transition point marking the contrast, and are temporally compact. Contrasts occur in several forms: contradictions (not X but Y), comparisons (more X than Y), and opposites (black or white). We ask whether gesture reinforces spoken contrasts by analyzing video of Barack Obama's performance in town hall debates from the 2008 and 2012 presidential elections. We identified contrasts according to criteria in Heritage and Greatbatch (1986) and coded gesture in ELAN using variables for hand shape, path, location, handedness, and hand orientation. We identified 53 spoken contrasts, 47 of which were accompanied by a gesture that illustrated a contrast by changing at least one gesture feature during the contrast in speech. We compared these to gesture during another rhetorical device (3-part lists), and found that gesture did not change features during lists. Gesture contrasts typically involved a change in gesture location or a deviation in path. We conclude that gesture reinforces the use of spoken contrasts, perhaps making them more salient to the audience. We further describe the use of spatial location in relation to position-taking and ask whether gesture can add a contrast where one is not explicitly marked in speech.

Keywords: politics, oratory, rhetoric, metaphor, co, speech gesture



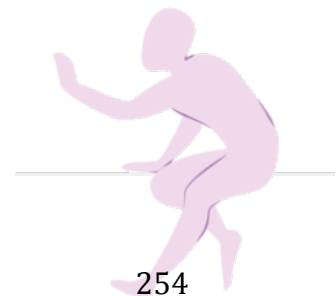
# Gesture and Preposition Learning

Kimi Nakatsukasa<sup>1,2</sup>, Gale Stam<sup>3</sup>, Benjamin White<sup>4</sup>

<sup>1</sup> Texas Tech University – Department of Classical and Modern Languages and Literatures Box 42071 Lubbock, TX 79409-2071 USA, United States <sup>2</sup> Ritsumeikan University – Department of Comprehensive Psychology 2-150 Iwakura-cho, Ibaraki, Osaka 567-8570 JAPAN, Japan <sup>3</sup> National Louis University – United States <sup>4</sup> St. Michael's College – Department of Applied Linguistics, Saint Edmund's Hall 124 One Winooski Park, Colchester, Vermont, 05439, United States

Educational psychology studies have reported that seeing gestures and gesturing assist children's cognitive development (e.g. Goldin-Meadow, Kim, & Singer, 1999). In the field of second language acquisition (SLA), researchers have reported some facilitative functions of gestures on L2 learning with regards to learners' comprehension, vocabulary and expression learning, and conversation strategies, to name a few (e.g. Allen, 1995, 1999; Gullberg, 2010; Tellier, 2008). However, more empirical studies are needed to fully understand to what extent teachers' and learners' gestures may or may not facilitate SLA. This intervention study was designed to investigate if seeing an instructor gesture and seeing an instructor gesture and gesturing themselves results in learners' better understanding of the prototypical and extended (temporal) meaning of the English prepositions at, in, and on. A total of 50 intermediate ESL learners in five different classes participated in the study. Each class was assigned to either a "seeing gesture" (SEE) or "seeing and repeating gestures" (REPEAT) condition. The data collection and intervention involved three phases. During phase 1, students filled out a background questionnaire and completed a pretest: (1) a preposition gap fill test where they individually explained why they chose the prepositions they did and (2) a scheduling task in which groups of two or three produced temporal prepositions spontaneously. A subset of learners' (n=21) interactions was videotaped. A week later, during phase 2, students received a 100-minute intervention in class which included an explanation that dealt with the core (locative) and extended (temporal) concepts of at, in, and on through iconic gestures and visual cues of the prepositions as well as individual and pair activities for the students. Learners from the SEE condition saw the instructor's gestures, and those in the REPEAT condition were asked to repeat and produce the gestures. Then, the students were given an immediate post-test (the same two tasks as the pre-test, except different versions) in their next class meeting. During phase 3, four weeks later, a delayed post-test (again different versions of the two pre-test tasks) was given. Our preliminary findings indicate that the learners from both conditions verbalized the new conceptualization. However, only some learners from the REPEAT condition exhibited changes in their gestures during the spontaneous production tests. Specifically, changes in gestures were observed with regards to 'at' indicating possible re-conceptualization. We will discuss why this occurred. We will also discuss changes in oral and written use of prepositions for both conditions and whether repeating gestures had an effect. We will offer suggestions on how gestures can be used in a language classroom to facilitate the conceptualization of L2 prepositions.

Keywords: Gestures, Prepositions, SLA, Language teaching



# Instructional gestures can resolve the fundamental tension between making and breaking common ground during classroom discourse

Mitchell Nathan <sup>1</sup>, R. B. Church <sup>2</sup>

<sup>1</sup> University of Wisconsin-Madison [Madison] – Madison, WI 53706, United States <sup>2</sup> Northeastern Illinois University (NEIU) – United States

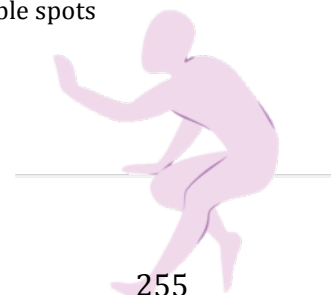
The need to manage common ground in classrooms is great: Learning necessitates a break in the common ground shared by students and their teachers, so that something genuinely new and unfamiliar can be apprehended. As a result, effective instruction must continually strive to re-establish common ground to advance student learning (Nathan & Alibali, 2011). Our central claim is that gestures are especially crucial at moments surrounding these intentional breaks in common ground in order to re-establish shared understanding during instruction so successful learning may occur. As expected from the experimental literature (e.g., Holler & Stevens, 2007; Kelly, Byrne & Holler, 2011), teachers exhibit high gesture production rates when introducing new ideas during instruction (Alibali et al., 2014), and when responding to students' trouble spots (Alibali et al., 2013), while these gesture rates decline as new material becomes more familiar.

We present two cases of moment-to-moment instructional interactions to illustrate how gestures are used to re-establish and maintain common ground following intentional breaks.

In Case #1, a teacher introduces 6th grade students to the idea of algebraic equations, with letter symbols standing for objects, and operators representing the relationships among objects. This is a major topic in mathematics education that sets the stage for nearly all mathematics to come. The teacher attempts to forge common ground by pre-emptively connecting the new, symbolic representation to a familiar physical system—a pan balance scale. The teacher notes that a balanced scale implies that the weights on both sides are equal even when the specific objects placed in either pan are not identical, and remarks about the special role of the exact midpoint – the fulcrum is much like the equal sign. The teacher repeatedly performs gestural catchments on the symbols to match the actions performed on the objects. For example, "If I take away a sphere on each side, does this still balance like said?" (lines 124-125) is followed by "So, I'm gonna [take away an s here], which is like crossing [that one off]" (lines 134-135) while she writes "– s" under both sides of the equation.

In Case #2, a teacher extends 8th grade students' (ages 13-14) understanding of multiplication to polynomials by linking it a familiar idea: computing the area of a rectangle. Through detailed linking gestures that depict specific mappings of symbolic terms to elements of the familiar representation, the teacher draws on students' wealth of prior knowledge about computing area. Through these links, the teacher makes the conceptual breach of a new mathematical idea both incremental and tractable to the students. The cyclic nature of breaking and making common ground creates a fundamental tension within pedagogical discourse that can be resolved through instructional gestures.

Keywords: Instructional gesture, common ground, classroom learning, intersubjectivity, trouble spots



## Using gestures to prime the mental timeline

Melvin Ng <sup>1,2</sup>, Winston Goh <sup>2</sup>, Melvin Yap <sup>2</sup>, Chi-Shing Tse <sup>1</sup>, Wing Chee So <sup>1</sup>

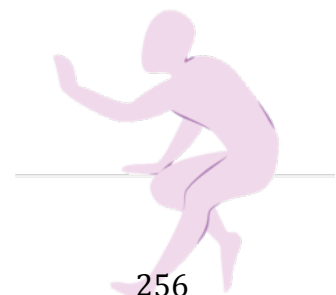
<sup>1</sup>The Chinese University of Hong Kong (CUHK) – Hong Kong SAR China <sup>2</sup>The National University of Singapore (NUS) – Singapore

Spatial metaphors are used to represent and reason about time. Such metaphors are arranged primarily along the sagittal axis in the majority of languages around the world (Radden, 2004). For example, in English, "The future lies ahead of us." and "We look back on our past." (Clark, 1973; Nuñez & Sweetser, 2006). These metaphors are often paired with gestures that reveal the possible axes along which our internal conceptualisation of time may be aligned (e.g., pointing to the front for the future and to the back for the past). Having said that, previous investigations have revealed inconsistent findings of a mental timeline along the sagittal axis. As such, the present study investigated whether English speakers represent time along a sagittal plane, using a cross-modal priming paradigm, with temporal gestures (e.g., pointing to the front/back) as primes and auditory tokens as the targets. Previous studies have shown that gestures prime semantically related words and concepts (Yap et al., 2011; Wu & Coulson, 2011). For example, Yap and colleagues found that participants responded faster to words (e.g., bird) preceded by semantically related gestures (a FLYING gesture) than unrelated gestures (a DRIVING gesture). Given the prevalence of gestures accompanying temporal speech (Casasanto & Jasmin, 2012), temporal gestures may allow us to access temporal concepts in an individuals' mind. Forty-four English-speaking adults participated in this study. In a congruent condition, they watched a gesture indicating "forward" followed by the auditory token, "tomorrow", given that the future is commonly conceived of as being ahead in English. An example of an incongruent condition would be the same word paired with a gesture indicating "behind". Participants made temporal classifications of words after watching a gestural prime. If speakers represent time along the sagittal axis, they should respond faster if the auditory target is preceded with a gesture indicating a congruent vs. incongruent spatial location.

The results supported our hypothesis. Participants responded faster to congruent-gesture word-pairs than to incongruent pairs,  $F(1,43)=4.372$ ,  $MSE=6238$ ,  $p<.05$ . This mirrors spatio-temporal metaphors commonly recruited to talk about time, with the past situated behind the individual and the future, ahead, suggesting that time is represented along the sagittal axis in both language and gesture. In addition, our findings demonstrate that gestures may not only be a means of accessing concrete concepts in the mind, as shown in previous studies, but may be used to access abstract ones as well.

Further studies are underway using the same gestural stimuli to investigate if specific axes are recruited when people think about time in different ways (e.g., an event is past- or future-related with respect to the present moment vs. an event is earlier or later with respect to a specified point in time).

Keywords: Time, gestures, priming, metaphor



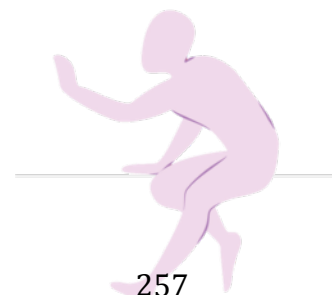
# Recall and perceived naturalness of asynchronous speech and gesture

Jens Nirme

Lund University [Lund] – Paradisgatan 2 Box 117, SE-221 00 Lund, Sweden

Part of the justification for an integrated view of speech and gestures ( is their temporal coordination. Gestures generally coincide with or precede, but rarely follow lexical affiliates (McNeill, 1992). How synchrony impacts listeners remains less explored, despite potential relevance for video communication and virtual conversational agents. ERP studies suggest that temporal alignment affects how words and gestures are integrated (Obermeier & Gunter, 2015) (Habets et al, 2011). Explicit perception of asynchrony is less sensitive and shifts longer than 1s can be tolerated (Kirchhof, 2014). However, gestures that are preceded by their lexical affiliates deviate from the expected pattern given regular exposure to speech which might implicitly affect listeners. We investigated whether the asymmetry of timing observed in production was reflected in differential effects of gestures shifted in either direction on how listeners perceive the speakers behavior as natural (Exp1) and/or impairing their processing and subsequent recall of words. (Exp2) Using motion capture to animate virtual speakers (giving explanations) allowed shifting specific gesture strokes within longer segments while preserving synchronized lip movements. For 16 short segments we produced videos in 3 conditions defined by the timing of a target gesture stroke relative a target word; either overlapping (SYNC) or shifted 500ms earlier (G-BEFORE) or later (G-AFTER). We classified the verbal content overlapping with shifted strokes by (unequally frequent) categories "congruent", "incongruent" or "filled/unfilled pauses". In Exp1, 32 participants saw a composition of 4 videos from each of the 3 mentioned conditions plus a variation of SYNC with distorted pitch during a few non-target words (AUDIO). After each video the participants rated their impression that it was based on a capture of natural or was artificially generated (by an undefined algorithm). We transformed each participant's responses to the range between 0 (most artificial) and 1 (most natural). Results revealed no significant differences between conditions. However, comparing the ratings between the categories of overlap revealed that strokes shifted to "filled /unfilled pauses" were rated as more artificial. In Exp2, 79 participants saw all 16 videos in one of four conditions. SYNC, G-BEFORE and G-AFTER were contrasted by a condition with seamlessly extinguished target gestures. Following each video and a distraction task, participants attempted to repeat what they heard in the video. Results revealed impaired recall of target words with extinguished or delayed gestures. In summary, asynchronous gestures were not perceived as less natural if overlapping with any words. Synchronous- and preceding- but not following- gestures facilitated recall, as expected if the processing of speech and gestures (involved in this particular task) would be tuned to temporal patterns common in natural speech.

Keywords: Co-speech gestures, multimodal integration, timing, animation, recall, memory, comprehension





# Pursuing responses through unfinished utterances in Czech ordinary conversation

Florence Oloff

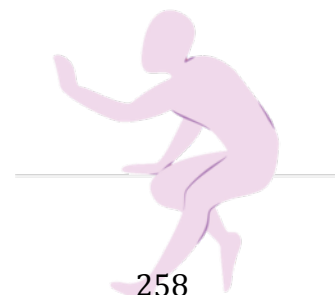
University of Zürich (UZH) – German Department, Rämistrasse 42, 8001 Zürich, Switzerland

In this paper, we will investigate an interactional practice for pursuing minimal, affiliative responses in Czech ordinary conversation. We will show that through the combining of syntactically incomplete utterances, gaze redirection towards the recipient and other embodied resources, current speakers project a specific minimal response type from their recipient. Using Conversation Analysis (e.g. Schegloff 2007, Sidnell & Stivers 2013) and a sequential, multimodal approach to social interaction (e.g. Streeck et al. 2011, Deppermann 2013, Hazel et al. 2014), our findings are based on fine grained transcriptions of videotaped mundane conversations in Czech among two or more speakers. Within Conversation Analysis, syntactically incomplete or unfinished utterances have been described as a recurrent practice for mobilizing response in both ordinary (Chevalier 2008) and institutional talk (Persson 2015). However, the variety of response types that may follow them has not been systematically described. The recipient can either respond through a pre-emptive completion (Lerner 1996, 2013, Persson 2015) or formulate a fitted, but syntactically independent response (Chevalier 2008, Chevalier & Clift 2008). In our contribution, we aim to study a third, more minimal response type, i.e., a response particle such as "yeah" and/or a head nod. Although syntactically incomplete turns can be completed by a variety of bodily movements (Olsher 2004), most research on the topic has been carried out using audio data, which is why we suggest having a closer look at embodied resources.

The recurrent pattern we will investigate is as follows: a syntactical construction is suspended at a point where the general (and syntactical) trajectory of the turn and of the speaker's stance have already been made available to the recipient. Shortly before suspending the turn, the current speaker turns her gaze to the recipient and carries out an embodied display of her stance, using facial expressions, head nods, hand gestures or shrugs. When the recipient has formulated a minimal response, sometimes only a visible one (head nod), the current speaker continues her suspended turn. Other examples show that completely absent or verbally more elaborated responses seem to be possibly misaligned in this sequential environment.

This paper not only contributes to a deeper and cross-linguistic understanding of interactive turn spaces (Iwasaki 2009, 2011), but also to the detailed investigation of recipient responses to bodily and facial stance displays (Ruusuvuori & Per'akyl'a 2009, Kupetz 2014). Although for the moment our data do not confirm the close link between unfinished turns and delicate topics (Chevalier 2009, Lerner 2013), the practice we describe seems to be frequent in environments where an assessment or a personal stance has been displayed, and where an affiliative response therefore seems to be a relevant next action (Stivers 2008).

Keywords: Conversation Analysis, multimodality, unfinished utterances, interactive turn space, turn, taking, Czech, ordinary conversation



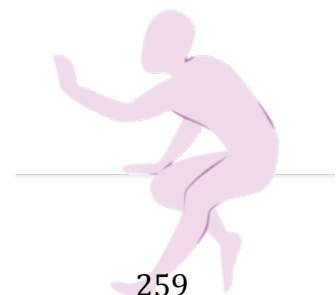
# Effects of pointing gestures on visuospatial working memory in young and older adults

Kim Ouwehand

Erasmus University Rotterdam – Netherlands

Because healthy aging has been associated with declines in working memory functioning (e.g., Salthouse & Babcock, 1991), it is important to find compensation strategies for older adults. Interestingly, a study by Chum, Bekkering, Dodd, and Pratt (2007) with young adults, showed that visuospatial working memory performance for figure locations that were multimodally encoded (i.e., visually observed and manually pointed at) during encoding was better than that for figure locations that were unimodally encoded (i.e., only visually observed). In the paradigm by Chum et al. (2007) participants were presented with a sequence of simple figures at different locations, consisting of an array of squares and an array of circles. They were instructed to point at (multimodal encoding strategy) one type of figure and only observe the other (unimodal encoding strategy). After each trial an immediate location recognition test of one of the two arrays followed. Using a task based on the paradigm of Chum et al., it was investigated in Experiment 1 whether we could replicate the positive effect of pointing on visuospatial working memory in young adults and whether this effect would extend to older adults. In Experiment 2, a visual cue was added to the paradigm, presented either before or after the encoding phase, about which of the two arrays would be tested. Results showed that a multimodal compared with a unimodal encoding strategy improved visuospatial working memory performance in both young and older adults (Experiment 1) and that adding visual cues to the multimodal but not to the unimodal encoding strategy improved older adults' performance up to the level of young adults (Experiment 2). In both age groups, cueing before encoding led to higher performance in the multimodal than in the unimodal condition when the first array of the figure sequence was tested. However, cueing after encoding led to higher performance in the multimodal than in the unimodal condition when the second array was tested. These results suggest that predictive cueing together with pointing can have beneficial effects on visuospatial working memory, which is especially important for older adults. In sum, the present study showed that a multimodal compared with a unimodal encoding strategy improved visuospatial working memory performance in both young and older adults (Experiment 1) and that adding visual cues to the multimodal but not the unimodal encoding strategy improved the level of older adults' visuospatial working memory performance to that of young adults. These findings are especially interesting from an aging perspective, because they suggest that (at least, in the present paradigm) gestures and visual cues can be used as tools to compensate for age-related declines in visuospatial working memory performance.

Keywords: Visuospatial working memory, aging, pointing



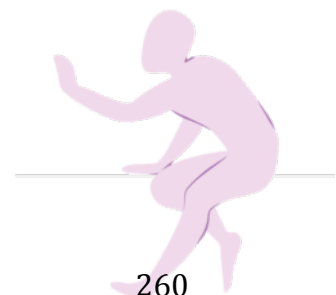
# What is the source of cross-linguistic variation in gesture?

Seyda Ozcaliskan<sup>1</sup>, Che Lucero<sup>2</sup>, Susan Goldin-Meadow<sup>2</sup>

<sup>1</sup> Georgia State University (GSU) – United States <sup>2</sup> University of Chicago – United States

Speakers of all languages gesture when they talk, but there are differences in the gestures they produce. Where do these cross-linguistic differences come from? One possibility is that children learn language-specific gestures by watching others gesture. An alternative is that children learn language-specific gestures by learning to speak a particular language. We turn to congenitally blind speakers to address this question. We know from previous work (Iverson & Goldin-Meadow, 1998) that blind speakers gesture when they talk, but we do not know if they gesture like native speakers. If seeing gesture is necessary to gesture like a native speaker, congenitally blind speakers around the globe should not be able to do it—they should all gesture alike since they lack the input that would create differences across their gestures. If, however, speakers learn to be a native gesturer by becoming a native speaker, congenitally blind speakers of a given language should look like every other gesturer who speaks that same language—they should produce gestures that look no different from the gestures produced by sighted speakers of that language. We examined this question by studying the speech and gestures produced by 40 congenitally blind adult native speakers of English and Turkish (N=20/language), and comparing them to 40 sighted adult speakers in each language (20 with blindfolds, 20 without blindfolds). We focused on speakers' descriptions of physical motion, which show strong cross-linguistic differences in patterns of speech and gesture use with respect to manner and path components of motion (Talmy, 2000). English speakers typically conflate manner and path into a single gesture or clause, whereas Turkish speakers produce separate gestures or clauses for manner and path (Kita & Özyürek, 2003). Each participant was presented with 12 three-dimensional scenes displaying motion in 3 different paths (from, over, to) across various manners (e.g., run, flip, crawl) and asked to describe them after exploring them haptically or visually. We transcribed all speech and gesture, and categorized each as either separated (manner and path are conveyed in separate gestures or clauses) or conflated (manner and path are conveyed within a single gesture or a single clause). All speakers showed the expected cross-linguistic differences in speech. Turkish speakers-sighted or blind- produced more separated responses than English-speakers, while English speakers produced more conflated responses than Turkish speakers. More importantly, we found the same pattern in gesture: Turkish-speakers-sighted or blind-produced more separated responses in gesture than English-speakers in all groups; English-speakers produced more conflated responses in gesture than Turkish-speakers in all groups. Our findings identify speech as the source of the cross-linguistic variation observed in gesture. Blind speakers learn language-specific gestures by learning to speak the language and not by watching others gesture.

Keywords: crosslinguistic variation in co, speech gesture, gestures of the blind, etiology of cross linguistic variation in gesture



# Language as dynamic multimodal performance calls for new models: a historical and theoretical perspective

Christophe Parisse<sup>1</sup>, Camille Debras<sup>2</sup>

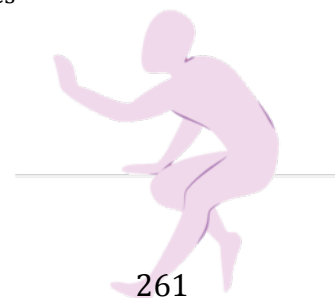
<sup>1</sup>Modèles, Dynamiques, Corpus (MoDyCo) – CNRS : UMR7114, Université de Paris X - Nanterre – Université Paris 10 Bâtiment A - Bureau 402 A 200, avenue de la République 92001 Nanterre Cedex, France <sup>2</sup>EA 4398 (PRISMES) – Université de la Sorbonne nouvelle - Paris III : EA4398 – France

While communication is at least as old as humanity itself, external representations of any symbolic nature, including written language, are much more recent. Written language has developed over millennia, gradually allowing humans to perform metalinguistic analyses of language and languages until the modern era, when Western grammarians have laid special emphasis on grammar and syntax to establish fixed forms of languages that could be taught and learned, from the 17th century until today (Auroux 1994).

The Saussurean inheritance has, among others, led linguistics to focus on the written, external representation of language, to the point that even still nowadays, the object of linguistics is for most linguists *la langue* as a written system (Saussure, 1972). This written language bias (Linell 2001) has led linguists to essentialize written language and to equate it with human language, while it is in fact only a metalinguistic representation of human communication (Harris 1996). The discrete units we use to study the language (phonemes, morphemes, sentences) are metalinguistic in nature, and mere interpretations of what language really is. Even as we transcribe spoken language, we make choices that impose a theoretical bias (Ochs 1979) on the stream of thoughts, sounds (Chafe 1994) and gestures that language performance (Chomsky 1965) or *parole* is made up of.

We suggest traditional information-processing models based on sets of reified discrete, categorical, atomic elements derived from the study of written language cannot account for dynamic, multimodal, contextualized language performance. New models that are not based on external representations are needed, and we present and discuss some of their essential principles. Some of these models already exist. For example, phonological exemplar theories rely on unlimited sets of basic exemplars, which are organized using non-discrete categories. Also, in construction grammars, an utterance can match more than one construction, and to different degrees. New models should also account for both the absence of direct correspondence between language production and its interpretation, and the impossible repetition of the same message twice, since context is constantly recreated anew (Duranti & Goodwin 1994). Furthermore, complex systems models developed in physics might be better suited to account for the dynamic process of language performance than traditional linguistics models based on a simplistic understanding of the compositionality of meaning. Gesture is inherent to language as a dynamic, multimodal, contextualized performance; and yet it is a domain with no historically fixed external representations. As such, it represents an opportunity for linguists to avoid the pitfalls of traditional linguistics and to think models of language anew.

Keywords: théorie linguistique, relation langage oral / gestuel, représentations linguistiques



# Visual Perspective, But Not Linguistic Perspective, Impacts Viewpoint in Gesture

Fey Parrill, Kashmiri Stec

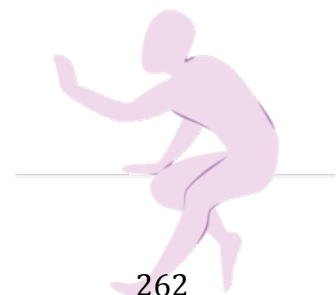
Case Western Reserve University (CWRU) – United States

In previous work, we found that manipulating the visual perspective of images participants saw influenced viewpoint in gesture: When retelling a story where some images were presented from an actor point of view, participants were more likely to use gestures from the point of view of a character (character viewpoint, or CVPT). When the same events were presented from the point of view of an observer, participants were more likely to produce gestures from the point of view of an observer (observer viewpoint, or OVPT). In this study we ask whether manipulating linguistic point of view has the same effect: When retelling a story from a first person point of view, do narrators use more CVPT gesture? 42 English-speaking participants read five stories in one of two conditions, Second Person ( $n = 21$ ) or Third Person ( $n = 21$ ). Each story consisted of 14 events presented as sentences, including three critical events that combined motor actions and paths (such events can be gestured from either C or OVPT). In the Second Person condition, sentences described the events as performed by you (e.g., you row your boat across the lake), while in the Third Person condition, sentences described the events as performed by he or she (e.g., she rows her boat across the lake). Participants were instructed to retell the events. Participants in the Second Person condition used first person to retell the stories despite not being explicitly prompted to do so.

Gestures co-occurring with descriptions of critical events were coded as CVPT or OVPT (or other, but all gestures were either C or O). We found no significant difference in the mean proportion of CVPT gestures produced across conditions ( $t(21) = 1.13$ ,  $p = .26$ : Mean Second Person = 0.46,  $SD = .17$ , Mean Third Person = 0.40,  $SD = .16$ ). This null result is of interest in contrast to our findings with regard to visual perspective and in relation to research indicating that second person pronouns do evoke an actor's perspective (Brunyé, Ditman, Mahoney, Augustyn, & Taylor, 2009). We relate these findings to frameworks in which motor action and mental imagery are linked to viewpoint in gesture.

Brunyé, T. T., Ditman, T., Mahoney, C. R., Augustyn, J. S., & Taylor, H. A. (2009). When you and I share perspectives. *Psychological Science*, 20(1), 27-32.

Keywords: viewpoint, visual perspective, linguistic perspective



# Didactical Use of Multimodal Resources by Senior Students Leading a Scientific Café.

Claire Polo, Kristine Lund

Interactions, Corpus, Apprentissages, Représentations (ICAR) – Université Lyon 2, ENS Lyon, CNRS : UMR5191 – Laboratoire ICAR (UMR 5191), Université Lyon 2 ENS de Lyon 15 parvis René Descartes - BP 7000 69 342 Lyon Cedex 07 France

## Introduction

The multimodal practice of teaching was studied as a combination either of semiotic modes (e. g. Lund, B'ecu-Robinault, 2013) or of speech and gesture (Alibali, et al., 2014, Goldin-Meadow, 2004, Valenzano, Alibali, Klatzky, 2003). Studies focusing on explanatory skills show that this combination gets more complex as a child grows (Colletta & Pellenq, 2005), and may vary depending on the interactional setting (Mazur-Palandre, Colletta, Lund, 2014). A common pedagogical practice consists in asking a tutor student to explain something to younger students. Nevertheless, how these students manage to do so in an authentic setting is still unstudied. This paper explores this issue on the basis of videotaped explanations elaborated by senior students for freshmen.

## Data and research questions

The pedagogical setting is an extracurricular activity, held in the USA and France, led by senior students for junior students. It is based on a multiple-choice questionnaire, and alternates class and group discussion, and 'knowledge questions' (KQ), and debate questions. For KQ, the leader student has to explain the correct answer, with the help of an information slide. We here study this specific task, comparing, for two KQ, three American and two French female leader students.

Two research questions guide our work: 1) how do these senior students use multimodal resources to manage with the task? ; 2) what are the didactical effects of their strategies? We focus on three multimodal resources: leaders' speech, their gestures, and the use of the slide. We also consider their body and head orientation to define their attention focus.

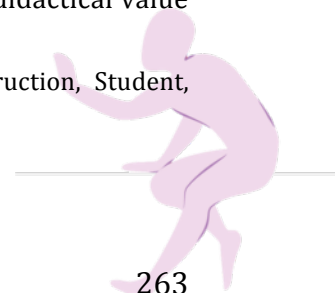
## Methodology: analytical steps

We first characterize the use of multimodal resources for each explanatory sequence. We investigate three aspects: a) attention focus; b) amount of referential gestures; c) use of gestures serving other aspects of the management of the interaction. We then define a typology of multimodal profiles.

Our second step focuses on the didactical effects of the identified multimodal strategies. It consists of an inventory of the information provided in each of the 10 sequences, comparing what is provided on the slide, what is added through leaders' speech, and what appears in their gestures.

**First results and significance** Most of the leaders alternate their attention focus between the screen and the audience. Attention to the screen is associated with pointing gestures and attention to the audience is associated with representational gestures. Our second analytical step, still in progress, already gives evidence of the large didactical work of the leaders, who provide a lot of information that is not on the slide. By the time of the conference, we will be able to assess the didactical value of their multimodal strategies, which can be useful to improve teachers' training.

**Keywords:** Multimodal resources, Didactical interactions, Explanation, Referential construction, Student, student interaction, Representational gestures





# The use of head gestures in a home sign system

Eli Raanes

Georg Bjerkli – HiST/NTNU, Faculty of Teacher and Interpreter Education , 7002 TRONDHEIM , Norway

This study considers how the head, including with the eye, mouth, tongue and face, may be used to produce meaningful gestures. For example, how does variation in such gestures contribute to meaning-making processes in conversations? In particular, a homesign system where various head gestures have become associated with conventionalized meanings is examined. This home sign system was in use from the mid-1950's up until very recently by a family located in a rural part of northern Norway. The homesigns were used between a deaf brother and his hearing siblings and family. They were developed in isolation from the national, deaf, signing community. This homesign system has been documented by video recordings, interviews, and signs lists from family members. In addition, information about how the signs originated and were used in the daily life of the family is documented. From this data, about 30 different signs/gestures produced solely with the head have been identified. It will be these gestures that are the focus of this presentation. Theory from signed language and gesture research, along with cognitive linguistics will be used in the description and analysis of these gestures/signs (Halvorsen 2012, McNeill 2005, Hendon, Harris and Key 2011). Findings show that a cognitive analysis reveals the meaning potential of these signs and refers to their iconicity (Taub 2001, Taylor 2002, Liddell 2003, Kendon 2004).

Halvorsen, Rolf. (2012). [Three discourse markers in Norwegian Sign Language: a study of blinks, eye gaze, and nodding in eight narratives]. *Tre diskursmarkører i norsk tegnspråk: en studie av blunk, blikkendring og nikk i åtte fortellinger*. Doctoral dissertation, University of Oslo.

Kendon, Adam (2004). *Gesture: Visible Action as Utterance*. Cambridge: Cambridge University Press

Kendon, Adam, Harris, Richard M. and Key, Mary R. World (2011). *Anthropology : Organization of Behavior in Face-to-Face Interaction*. Munchen, DEU: Walter de Gruyter.

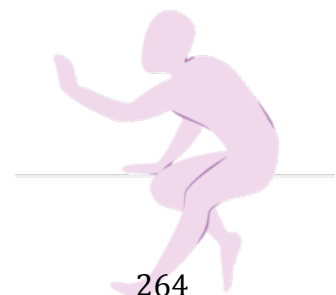
Liddell, Scott K. (2003). *Grammar, gesture, and meaning in American sign language*. New York: Cambridge University Press.

McNeill, David (2005). *Gesture and Thought*. Chicago: Chicago University Press

Taub, Sarah (2001). *Language from the body: iconicity and metaphor in American Sign Language*. Cambridge: Cambridge University Press.

Taylor, John R. (2002). *Cognitive grammar*. Oxford: Oxford University Press.

Keywords: gesture, sign language, home signs, origin of sign, meaning construction based on gesture



# Crystal Gestures : how do co-speech gestures become a gesture of creativity in cinematographical and choreographical works?

Kadriye Ramazanoglu

Ecole des Hautes Etudes en Sciences Sociales (EHESS) – France

So far, the terminology used in connection with gestural expression seems perplexing in artistic disciplines, which is probably due to the fact that theoretical clarifications made by linguists on gestures are not yet well-known in these domains. Since we are surrounded by a multiplicity of gestural practices, several precisions in each field appear to be crucial by taking into account the recent findings on "the multimodal nature" of gestures (e.g Kendon 2004 & McNeill, et al. 2002 & Özyürek 2014). For instance, in performing arts and cinema, gestures are exhibited according to several aesthetic preferences and thus performed with or without speech, where we mostly witness a rupture with representation.

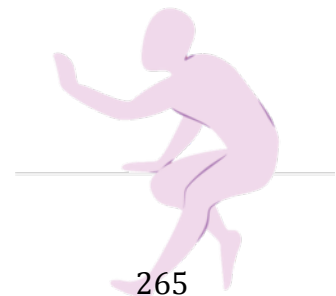
In this paper, my purpose is to explore how formal & semantic aspects of co-speech gestures are portrayed in cinema, video art and dance; to analyse how micro-movements of our body when we talk are treated in cinematographical and choreographical works and accordingly to propose to qualify co-speech gestures as a dynamic element in artistic creation.

Previous studies in linguistics have pointed out characteristics such as "co-expressivity" (Kendon 1972, Schegloff 1984), "synchronicity" (McNeill 1992) and "(in)congruity" (de Fornel 1993, Özyürek 2014) in co-speech gestures. In the meantime, there have been various typological attempts to understand the nature of gestures accompanying speech and thus several classification schemes have been developed (Efron 1941, Ekman & Friesen 1969, McNeill 1992). The present work suggests a tentative taxonomy constructed in accordance with the expressive potential inherent in co-speech gesture performance, which may function more appropriately in studying the role of gestures in audio-visual arts.

In order to reveal the diversity of imagery which co-speech gestures convey, several sequences taken mainly from experimental, documentary, and fictional films as well as a few extracts from contemporary dance will be analysed. First, I will discuss the question of temporal synchrony between the gesture component and the acoustic peaks of a co-speech gesture production in daily conversation by referring to the taxonomy explained above. Then, I will display how the feature of "co-expressivity" is crystallised by cinématographers, video artists and choreographers in many different ways. To illustrate my purpose, the corpus gathered for this research is not limited to hand gestures yet all sorts of bodily expression which play the role of "visual articulators" (Özyürek 2014) are taken into consideration.

This paper aims at making a bridge between researches on gestures carried out in the domain of linguistics, semiotics and anthropology and that of the theories on gestures made in relation to cinema and performing arts.

Keywords: co-speech gestures, co, expressivity, synchrony, multimodality, crystallisation, cinematography, choreography, artistic creation



## Gesture and artwork: The museum docent at work

Padma Ramsamy Prat <sup>1</sup>, Anne Jorro <sup>2</sup>, Jamila Al Khatib, Marie-Josée Quesnel

<sup>1</sup> Centre de Recherche sur la Formation (CRF) – Conservatoire National des Arts et Métiers (CNAM) – 41 rue Gay Lussac 75005 Paris, France <sup>2</sup> Centre de Recherche sur la Formation (CRF) – Conservatoire National des Arts et Métiers [CNAM] : EA1410 – 2, rue Conté 75003 Paris, France

The Arts et Metiers museum is part of the Conservatoire National des Arts et Metiers university, created in 1794 by priest Gregoire. The museum houses rare and ancient collections: Lavoisier laboratory, Bleriot's plane which crossed the North sea... It possesses remarkable pieces of art that show the gestures of engineers and the evolutions of technical objects. It has a historical know-how in terms of mediation explained to craftsmen. Nowadays, this tradition pursues and the museum offers pedagogical activities to students and the general public.

This research focuses on the art of performing in education, cultural and scientific mediation with the objective of studying the actions of professionals in the same fields. Those different professionals share a common view: make artistic productions, technical objects, and technical knowledge available and easily understandable to visitors.

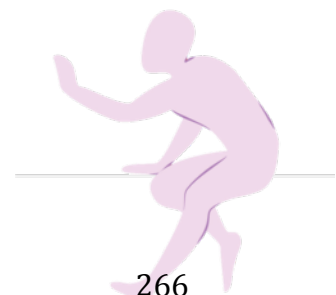
While the arrangements of words carry the meaning being expressed, gesture prolong the explanation for a while. Gesture allows those who rely on visual memory to capture the fullness of the explanation given in words. Our framework is built on a pluridisciplinary approach. The theories of historical anthropology (Gebauer & Wulf 2004), phenomenology (Merleau-Ponty 1945), sociology (Mauss) allow grasping the primary expression of the body in professional performance. We make the hypothesis that approaches on teachers' professional gestures (Jorro 2002, 2010) and those of trainers (Alin 2011, 2016) will represent the starting points to characterise professional gestures of museum docents in a gallery space considered as a learning space.

We question how the professional educate visitors and transmit knowledge. Are there specific professional gestures performed? Which gestures would characterize professionalization?

### Methodology

Semiotic analysis will help the researchers to analyse two videotaped demonstrations, one introducing the Foucault's pendulum and another master piece. The professionals will provide information about their actions when viewing the film. We will carry out micro phenomenological interviewing (Vermersh 1994, 2011) in the aim of having access to their private thoughts.

Keywords: gestures, cultural mediation, learning



# Gestures and emotions: Yoga and embodied feelings in children

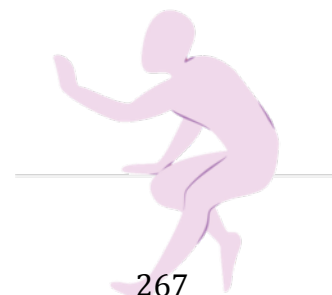
Roxanne Rashedi

University of California Davis (UCD) – 501 Shields Avenue Davis, CA 95616, United States

Mindfulness invites one to be present with sensations that come to the fore, regardless of whether these sensations manifest physiologically, cognitively, and/or emotionally. In this sense, the dichotomy between body and mind is set aside, for the body is seen as a source of knowledge. Yoga is a mindfulness practice and integrates attention, breath control, and postures. Literature has suggested that yoga promotes self-regulation in children (Shapiro et al., 2015). Given self-regulation contributes to emotional well-being, researchers have investigated the effects yoga may have on children's emotional awareness and empathetic understanding (Flook et al., 2015). However, much of this literature relies on teacher reports and behavioral tasks. We do not hear participants' perspectives of these practices. For instance, what meanings do children make and attach from having participated in yoga?

My presentation addresses these questions. This talk discusses principals that can inform the study design of school-based yoga interventions. Drawing on my teaching, I analyze kids' experiences of the classes, which encompass a range of semiotic resources (Goodwin, 2000), including gesture, the mat, and storytelling. My presentation examines how teachers could use gesture to introduce children to abstract, emotional concepts. Discussing this multimodal data, I explore how children attach meaning to their experiences in verbal and nonverbal forms. As such, this presentation will demonstrate what Nathan (2008) has documented extensively in his work on embodied cognition, in which the relationship between body and mind is essential for learning abstract concepts. However, rather than focusing on “symbolic off-loading” as it relates to learning concepts in math (Nathan, 2008, p. 388), I analyze how the linkage of poses embodied in stories may help children ground into their bodies, the learning environment of the yoga class, and the mapping between unfamiliar, familiar concepts and emotions.

Keywords: embodied storytelling, yoga, gesture, emotions, children



# A richly-connected communicative network hastens conventionalization of gestural referring expressions.

Russell Richie, Matt Hall, Marie Coppola

University of Connecticut – United States

## Introduction

How do people agree on what to call things? Richie et al. (2014) observed that lexical conventionalization was greater among signers of a young sign language (Nicaraguan Sign Language; NSL) than among members of a homesign network that had been in existence for the same number of years. They hypothesized that this difference could be due to differences in the communicative structure of the two networks. NSL signers approximate a richly-connected network (Figure 1, right), in which all possible members use the system to communicate with one another. In contrast, homesigners generally belong to more sparsely-connected networks (Figure 1, left), using homesign with interlocutors who do not use homesign when communicating amongst themselves. Richie et al. then built a computational model to test whether abstract agents differing only in network structure would show the same pattern, which they did. However, other computational simulations provide contrasting results (Gong et al., 2012, Judd et al. 2010), suggesting that subtle differences in simplifying assumptions and operational definitions may significantly impact findings. The current study avoids these problems by studying the behavior of human participants engaged in a gestural communication task.

## Method

We randomly assigned 16 groups of 4 adult hearing non-signers to one of two conditions: Sparse or Rich. In the Sparse condition, one participant is randomly designated as the "hub", and engages in the gestural communication task with the other three participants; however, the other three never perform the task with each other. In the Rich condition, all possible pairs of participants engage in the gestural communication task. Dyads then proceeded as shown in Table 1. Participants took turns describing and comprehending gestured descriptions of real-world objects.

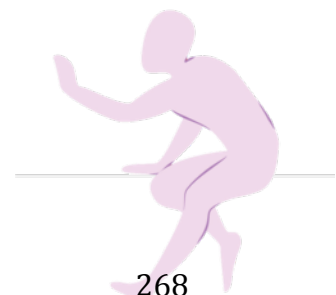
## Results

Pairwise ("Direct") conventionalization was equivalent between the two conditions. Crucially, network-wide ("Indirect") conventionalization is greater in the richly-connected network, consistent with Richie et al. (2014)'s original findings. However, the greater conventionalization in richly-connected networks was largely due to the fact that more interactions take place per round in the Rich than in the Sparse condition (by definition).

## Discussion

Studying gestural communication allows us to experimentally test hypotheses derived from studies of natural language emergence. The present results provide important context for interpreting previous computational simulations. Consistent with Richie et al. (2014), the results confirm that network structure impacts conventionalization, but suggest that the number of interactions may play a larger role than previously thought.

Keywords: Emerging sign language, communicative network structure, lexicon



# Truncated signs in French Sign Language = a class of anaphorical verbal clitics, indexicals for role-shifts

Annie Risler

Savoirs, Textes, Langage (STL) – CNRS : UMR8163, Université Lille I - Sciences et technologies, Université Lille III - Sciences humaines et sociales – Domaine Universitaire du Pont de Bois Batiment B4 rue du Barreau - BP 60149 59653 VILLENEUVE D'ASCQ CEDEX, France

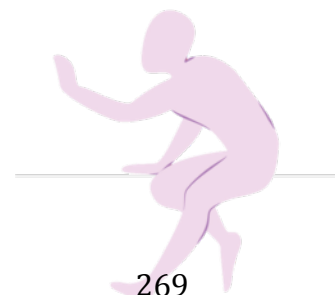
Self-reference is realized by a universal gesture of pointing toward one's own chest, including in Sign languages. But this gesture doesn't always constitute a reference to the signer, due to its simultaneous occurrence with another gestural figure called Role-shift (RS). Through this mechanism the signer shifts into the role of a character, conveying information from that character's perspective with postural and facial attitudes. A gesture of self-designation in role-shift encodes an explicit reference to this character. Role-shifts and pointings are typical examples of gestural and linguistic blending. Role-shifts are sometimes considered as pragmatic frames specifically used in narratives, from a depictive point of view, called constructed actions (Liddell) or transfers (Cuxac). In fact, RS are not confined to depictive intentions but are involved with predicates of action, feeling, thought or interaction. Despite the fact that these predicates are often presented as directional verbs, their use in discourse shows that subject is usually associated with a corporal rather than a spatial locus. The chest has to encode morpho-syntactic and enunciative markers, such as locus-c (Engberg-Pederson 1995) when the body determines the place of the subject in the predicative construction, and point of view (Lillo-Martin 1995) because RS determine the deictic landmark of the utterance, which is not the signer him or her-self, nor here and now (Quer 2005).

Nilsson (2004) and Meurant (2008) claim that there is, in Swedish and in Belgian Sign Languages, a reduced form of self-pointing which is specially associated with RS. It is considered as a clitic mark joined to the predicate, like a neutral pronoun just indicating that referential value of the corporal locus is shifting. Because it doesn't provide information about his referential value, Nilsson (2004) and Lillo-Martin (2012) discuss its proximity with logophoric pronoun.

Our study on self-pointing argues for the existence of a similar clitic form of self-pointing in French Sing Language, associated with RS. Our work was initially based on FSL corpus LS- Colin extending further to spontaneous data. It shows that the reduced form of self-pointing is very frequently used, but stays often unperceived.

In contrast with previous studies, we claim that reduced self-pointing is not the only referential marker of RS. We will present several truncated forms that constitute a separate category, functioning as anaphoric clitics. They recall the referential value of the RS when the predicate is not preceded by a noun-phrase for the subject. Our research reveals an interesting grammaticalisation process : a phonetic reduction can be applied to any noun-form for personal or nominal r'ef'ference. It also behaves as a clitic-form joined to the predicate. The distribution of these clitic markers support the hypothesis that they allow to come back to a previous role-shift.

Keywords: Langue des Signes, role, shifts, clitics





# Strong and weak agents in gesture and emerging sign language

Lilia Rissman <sup>1</sup>, Laura Horton <sup>1</sup>, Molly Flaherty <sup>1</sup>, Ann Senghas <sup>2</sup>, Marie Coppola <sup>3</sup>, Diane Brentari <sup>1</sup>, Susan Goldin-Meadow <sup>1</sup>

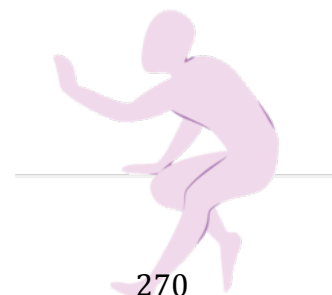
<sup>1</sup> University of Chicago – United States <sup>2</sup> Columbia University – United States <sup>3</sup> University of Connecticut – United States

The languages of the world utilize various strategies for demoting the agent in an event, e.g. passive voice (Siewierska, 2013). We ask whether individuals spontaneously distinguish more or less salient agents in gestural descriptions of simple events. We test a continuum of signers, from hearing individuals without experience using the manual modality as their primary communication method, to deaf individuals who have both a linguistic community and a language model. We find that all groups use handshape to distinguish scenes with and without a human agent, but only signers who have exposure to both community and model further distinguish between events with more or less salient agents. This finding indicates that linguistic encoding of non-canonical thematic role relations evolves relatively slowly. Hearing participants in the United States described short videos without using their voice ("silent gesture"). We compared the silent gesturers (N = 8) to three participant groups in Nicaragua: 1) adult homesigners – deaf individuals who have learned neither signed nor spoken language (N = 4); 2) Nicaraguan Sign Language signers who were among the first deaf individuals to come together at a newly-founded deaf school (Cohort 1; N = 8); and 3) NSL signers who learned the system from their older peers in Cohort 1 (Cohorts 2 & 3; N = 10).

In many sign languages around the world, agency is encoded via handshape morphemes in classifier predicates (Benedicto & Brentari, 2004). For example, handling handshapes (e.g., the hand represents how the pen is held as it is lifted off a table) are used in predicates that describe agentive events. By contrast, object handshapes (e.g. an extended index finger represents the pen itself as it rolls off a table) are used in predicates that describe agent-less events. Participants in our study viewed events from three conditions: Agent-Body (e.g., an agent tips over a book and the agent's body is visible), Agent-Hand (e.g., an agent tips over a book but only the agent's hand is visible), No-Agent (e.g., a book falls over on its own). We coded the handshape of each predicate (handling vs. object), and categorized each trial by response strategy: handling predicates only, object predicates only, or both handling and object predicates.

Figure 1 shows that all participants use more handling predicates in Agent than in No-Agent trials. Nonetheless, Figure 2 shows that only Cohort 2&3 signers distinguish Agent-Body from Agent-Hand events, producing relatively fewer handling predicates in the Agent-Hand events, i.e. when less of the agent is visible. The fact that only Cohorts 2-3 distinguish between events where the agent is more or less salient suggests that linguistic input is essential to the emergence of agent-demotion devices.

Keywords: agency, classifier predicates, Nicaraguan Sign Language



## "A long thing for chopping" – how verbs become nouns in Yucatec Maya Sign Languages

Josefina Safar

Stockholm University – Sweden

In this paper, the use of size-and-shape specifiers (SASSes) will be examined in Yucatec Maya Sign Languages (YMSL) from three villages in Yucatán, Mexico, as a vivid example for sign language creation on the basis of iconic gestures.

In my study, I focus on the difference between signs for objects and activities performed with these objects, i.e. the distinction between nouns and verbs in YMSL.

Previous studies have shown that in many sign languages, the manual parameters for nouns and verbs are similar, but they might be distinguished by frequency, amplitude/manner of movement, duration or mouthing (see Tkachman & Sandler 2013 for a literature review).

Furthermore, Padden & al. (2015) point out a difference in iconic strategies, i.e. instrument vs. handling strategies, used for nouns and verbs related to tool use. A similar distinction has been demonstrated by Petatillo Chan & Le Guen (2015) for YMSL.

My study explores a further device for noun-verb distinction, which has also been reported by Tkachman & Sandler (2013) or Haviland (2013), namely the use of size-and-shape specifiers (SASSes) (Supalla 1986) in compounds.

A set of photo stimuli was shown to YMSL signers from the villages Chicán, Nohkop and Cepeda Peraza. The photos depict either an object alone or the same object being manipulated by a human actor. The objects included tools, household items, recipients or other common items of everyday use.

A total of 24 noun-verb pairs was collected from each signer, e.g. HAMMER vs. HAMMER-IN-NAIL, MACHETE vs. CHOP-WITH-MACHETE, FOOTBALL vs. PLAY-FOOTBALL etc.

Interestingly, signers from all three communities show a similar tendency: the verb seems to be the unmarked or "default" form whereas for nouns, a SASS describing salient characteristics of the object (long, round, small...) is attached to the sign, resulting in a compound-like construction (see examples in Fig. 3,4,7,8). The SASS can either precede or follow the noun.

In my talk, I will examine frequency, form and position of the SASS, showing that certain objects trigger the use of SASSes more than others and that a substantial amount of individual variation persists. The marking by SASSes is not obligatory, but it is a strategy frequently employed by YMSL signers from all three communities.

My findings suggest that similarities in Yucatec Maya Sign Languages go beyond the lexicon and that they also resemble each other in terms of their formational principles. Moreover, the study provides evidence that a noun-verb distinction can already be present in very young sign languages.

Observations of co-speech gestures among the surrounding hearing population reveal that speakers of Yucatec Maya commonly use gestures to describe size and shape of human or non-human referents (Petatillo Balam 2015, Zavala 2000). It seems plausible to assume that deaf signers draw from these gestural resources and further conventionalise them into signs.

Keywords: sign language, Yucatec Maya sign language, village sign languages, sign language emergence, noun, verb distinction

# Embodiment and discourse cohesion in five sign languages

Marie-Anne Sallandre <sup>1</sup>, Alessio Di Renzo, Robert Gavrilesco <sup>1</sup>, Alexandre Daniel<sup>1</sup>

<sup>1</sup> Structure formelle du langage : typologie et acquisition, metrique et poétique (SFLTAMP) – CNRS : UMR7023, Université Paris VIII Vincennes-Saint Denis – France

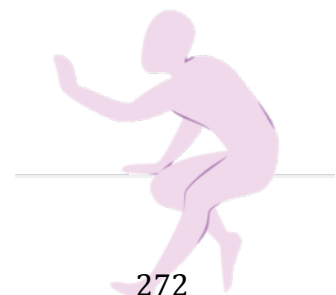
Personal transfers (often called Constructed Actions or role shifts, Metzger 1995; Lillo- Martin 2012; Cormier, Smith & Sevcikova, in press) are very frequent structures in sign language discourse (Cuxac & Sallandre 2007). These structures involve the signer's whole body to reproduce one or more actions carried out or sustained by an entity in the course of the utterance. The entities are usually human or animal but can also be inanimate. The movements of the signer's body and face, the direction of eye gaze and facial expression represent those of the transferred entity. The handshape and orientation of the signer-narrator's hands portray the basic form of an action (movement of the hand(s), e.g. grasping, walking). Furthermore, some of these structures can be combined together, for example when two entities are expressed simultaneously in a same structure (a double transfer in our terminology; multiple references in Dudis 2004).

The present study uses data from five sign languages: French, Italian, Romanian, Flemish and Japanese sign languages (Cuxac et al 2002; Sallandre & L'Huillier 2011 ; Di Renzo 2015; Gavrilesco 2014; Daniel 2015; Van Herreweghe, Vermeerbergen et al 2015). Our corpora are made of narratives performed by five Deaf adults in each language (n=25 signers). The stories are based on the same stimuli (a picture story (the Horse) and Tom and Jerry cartoons), and are therefore fully comparable. These sign languages are all visuo-gestural languages used by Deaf people, but they share few or no historical links. Four of these share the European culture and Latin alphabet for fingerspelling, while Japanese Sign Language is not correlated and borrows other types of written rules. We hypothesized that the introduction of referents is done through different devices in this language, because of the very different lexical system, but that the re-introduction of referents is done through personal transfers, as the other sign languages do (Pizzuto et al 2008, for a first comparison on ASL, LSF and LIS).

Our results showed that signers produced a wide range of personal transfers, averaging at 60% of the signs produced in each language, regardless of language. Animate entities in our stories (horse, cow, cat, mouse) were typically introduced by a lexical sign, but re-introduce through a personal transfer and/or a pointing gesture. Thus, the strategy of embodiment seems to be very productive in these visuo-gestural languages.

This study, conducted on a few samples of sign productions, confirms the similarities between sign languages and the importance of personal transfers for discourse cohesion. The visuo- gestural modality seems to have an impact on the structure/organization of the discourse, particularly on how entities are expressed and embodied in such fully-fledged languages.

Keywords: sign language, typology, embodiment, constructed action, discourse cohesion, visual modality, Deaf



# Infants' communicative behaviors and maternal responses in extremely preterm mother-infant dyads at 12 months

Alessandra Sansavini <sup>1</sup>, Erika Benassi <sup>1</sup>, Annalisa Guarini <sup>1</sup>, Silvia Savini <sup>1</sup>, Maria Cristina Caselli <sup>2</sup>, Jana Iverson <sup>3</sup>

<sup>1</sup> Department of Psychology, University of Bologna, Bologna, Italy – Italy <sup>2</sup> Institute of Cognitive Sciences and Technologies, National Research Council, Rome, Italy – Italy <sup>3</sup> Department of Psychology, University of Pittsburgh, Pittsburgh, USA

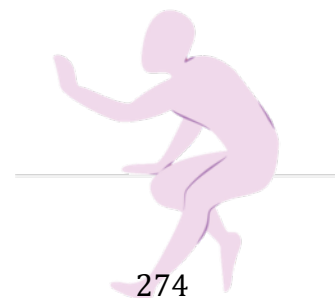
Preterm infants often show delays in early communicative development that may have negative cascading effects on language acquisition (for review, see Sansavini, Guarini, & Caselli, 2011). Despite the relevance of early communicative behaviors for language development, they have received little attention in studies of preterm infants and findings have been mixed. In particular, very little research has focused on early spontaneous communicative behaviors in extremely-low-gestational-age infants (ELGA < 28 weeks), who are at higher risk for developmental delays. Furthermore, relationships between infants' communicative-linguistic skills and mothers' communicative responses in mother-ELGA infant dyads have not yet been examined. According to a development perspective that acknowledges the bidirectional nature of parent- infant interaction (Leezenbaum et al., 2014), the present study aimed at investigating ELGA infants' early communicative behaviors and their relationship to maternal responses. Forty monolingual Italian 12-month-old infants- 20 ELGA infants (mean GA = 25.7 weeks, examined at their corrected age) and 20 control FT peers (mean GA = 39.5 weeks)- were recruited. Infants' communicative behaviors and maternal responses during 30 minutes of spontaneous mother-infant play interaction were coded by two independent coders using Interact software. Infants' spontaneous communicative behaviors were distinguished with regard to their developmental level as earlier deictic (requesting/showing), later deictic (pointing/giving), conventional, and representational gestures, and earlier (vocalizations/babbling) and later (words) vocal utterances. Maternal responses to these infants' communicative behaviors were coded with regard to contingency and saliency. Infants' receptive language, expressive language, cognitive, and motor skills were examined using the Bayley-III Scales.

Our findings revealed that compared to FT infants, ELGA infants showed higher rates of earlier deictic gestures (requesting/showing; Mann-Whitney test:  $p = .042$ ), but lower rates of later deictic (pointing/giving) and representational gestures (Mann-Whitney tests:  $p = .005$ ;  $p = .015$ , respectively). Less advanced motor and cognitive skills were also found in ELGA relative to FT infants (ANOVAs;  $p = .003$ ;  $p = .006$ , respectively). Salient maternal responses were positively correlated with earlier deictic gestures (Spearman:  $p = .005$ ) and receptive language skills (Pearson:  $p = .002$ ) in the ELGA group, but with later deictic gestures (Spearman:  $p = .047$ ) in the FT group.

Our findings highlight in ELGA infants a weakness in early gestural behaviors, especially in those that are more developmentally advanced, i.e. pointing, giving, and representational gestures, and in motor and cognitive skills. A close relationship between saliency of maternal responses and both early gestural behaviors and receptive language skills was also shown in the ELGA infants. We discuss the relevance of examining spontaneous communicative behaviors as potential indices for early detection of infants at risk for language delays and the role of salient maternal responses for supporting communication and language development in this population.

## Talks

Keywords: extremely preterm birth, gesture, vocal production, maternal responses, 12 month, old infants



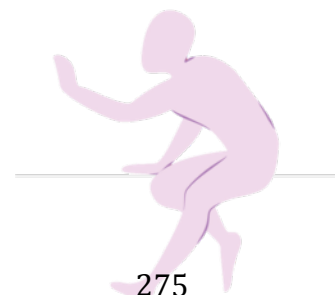
# Indicating verbs as 'multimodal' constructions

Adam Schembri<sup>1</sup>, Kearsy Cormier<sup>2</sup>, Jordan Fenlon<sup>3</sup>

<sup>1</sup> University of Birmingham (UoB) – Department of English Language Applied Linguistics 3 Elms Rd Edgbaston Birmingham B15 2TT, United Kingdom <sup>2</sup> University College London - London's Global University (UCL) – Gower Street - London, WC1E 6BT, United Kingdom <sup>3</sup> University of Chicago – Edward H. Levi Hall 5801 South Ellis Avenue Chicago, Illinois 60637, United States

Indicating verbs in sign languages can be directed towards locations in space associated with their arguments (e.g., Liddell, 2003; Johnston & Schembri, 2007). For the last two decades, there has been a debate amongst sign language linguists about whether or not this directionality represents a fusion of morphemic and gestural elements, and the degree to which it shares properties with verb agreement systems in spoken languages (Liddell 2000, 2003; Meier, 2002; Lillo-Martin & Meier, 2011). In corpus-based studies of indicating verbs on Auslan (Australian Sign Language) and BSL (British Sign Language), de Beuzeville et al (2009), Schembri and Cormier (2009), Cormier et al. (accepted) and Fenlon et al. (under review) have provided evidence that indicating verbs share few key features with canonical verb agreement systems, that directionality is optional, that it favours motivated uses of space and that it interacts with other gestural phenomena in sign languages, such as constructed action. In this paper, we present the evidence in support of the claim that indicating verbs represent a kind of composite construction of sign and deictic gesture, analogous to the multimodal motion constructions identified in recent work on co-speech gesture (Zima, 2014). One of the arguments against the gesture analysis has drawn on the fact that indicating verbs have a number of specific lexical and grammatical properties that are not what one might expect if the sign is a fusion of morpheme and deictic gesture (e.g., Meier, 2002). Construction Grammar theory proposes two important factors that reflect both individual entrenchment and socio-cultural conventionalisation of constructions: (1) recurrence and (2) idiosyncrasy. The former refers to the fact that frequency of usage leads to an individual perceiving such co-occurrences as a relatively fixed combination of form and meaning which is stored in the individual's memory as a unit. As such, specific formal and/or semantic/pragmatic properties come to be associated with this unit, sometimes in a way that cannot be attributed to the compositional properties of its components. The frequent combination of deictic gesture and verb signs certainly seems to reflect entrenchment in the minds of individual signers and conventionalisation of these combinations in signing communities. Additionally, the fact that these particular combinations vary from one sign language to the next and that individual indicating verbs show some idiosyncratic properties also matches what would be predicted in a Construction Grammar account. The crucial difference for sign languages is that indicating verbs are unimodal (rather than multimodal) fusions of lexical items and gesture, making them a typologically unique linguistic phenomenon.

Keywords: sign languages, deictic gestures, multimodality, construction grammar





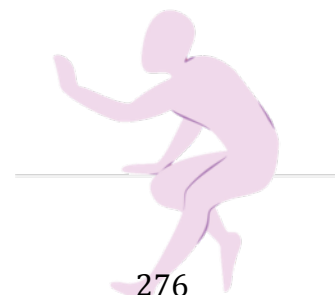
# Palm-up in co-speech gesture and in sign language

Steven Schoonjans

KU Leuven / FWO-Vlaanderen – Belgium

The flat hand with the palm facing upwards is a common form in both co-speech gesture and sign language. Müller (2004) offers an overview of uses of this 'PUOH' ('palm up open hand') in co-speech gesture (cf. also Kendon 2004:264). Among other things (and not necessarily using Müller's terminology), it is used as an interpersonal deictic showing agreement, as an 'offering conduit' presenting the information given or a 'begging conduit' asking for this information, and as the handshape of so-called palm-lateral gestures (Kendon's [2004:256] 'Open Hand Supine with lateral movement'). While there are some differences between these different gestures (e.g. tensed vs. lax, held in place vs. movement etc.), all of them share the feature 'PUOH', and given that there is a conceptual relation between them as well, Müller proposes to consider 'PUOH' as a gesture family. In sign languages as well, the so-called 'palm-up gesture' is a common form, and different studies (admittedly on different sign languages) have equally hinted at a variety of functions and uses. For Sign Language of the Netherlands, for instance, Van Loon (2012) distinguishes (among other things) uses as a stance marker, as a question particle, and as a marker of discourse structuring and turn negotiation (Van Loon's 'interactive functions'), and in her work on Danish Sign Language, Engberg-Pedersen (2002) explicitly relates palm-up with the conduit metaphor hinted at before for co-speech gesture. Although the issue has not been discussed as extensively in the literature yet, it seems that once again, there may be slight differences in form between the different uses. The goal of this presentation is to bring together these observations on palm-up. This will be done on the basis of a comparison of data from German Sign Language (DGS) and German co-speech gesture, bringing together the data sets from Herrmann (2013) on DGS and Schoonjans (2014) on German. The research question is double: 1° to what extent do we find the same functions for palm-up in co-speech gesture and in sign language and 2° do we find similar tendencies regarding formal differences between the different uses/functions?

Keywords: palm up, cospeech gesture, sign language



# From natural order to convention in silent gesture communication and transmission

Marieke Schouwstra, Kenny Smith, Simon Kirby

Language Evolution and Computation Research Unit, School of Philosophy, Psychology and Language Sciences, University of Edinburgh – United Kingdom

Silent gesture, an experimental paradigm in which adult hearing participants describe events using only their hands, has been valuable for investigating the origins of word order. Goldin-Meadow et al. (2008) found a language-independent preference for SOV for extensional transitive events (e.g., boy-ball-throw), but participants prefer SVO for intensional events (e.g., boy-search-ball; Schouwstra & de Swart, 2014). The SVO/SOV pattern for intensional/extensional events arises independently of participants' native language, and, we will claim, represents naturalness, reflecting cognitive preferences to put Agents first (Jackendoff, 2002) and more abstract/relational information last. However, existing languages tend not to condition word order on event type and are instead more regular. Understanding this transition from naturalness to conventionalised regularity is a major goal of language evolution research. We present a new approach to this challenge using a novel experimental paradigm in which silent gesture is both used for communication (Christensen et al, 2016) and culturally transmitted through artificial generations of lab participants (Smith et al, in prep).

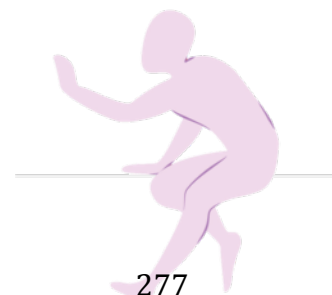
In experiments 1 and 2, 48 participants were assigned into dyads. Stimuli were 64 line drawings of intensional and extensional events. Participants alternated between the role of actor and interpreter, in six rounds of 32 trials. As actor they described an image using only their hands, and as interpreter they selected (from an array of 8) the image they thought was intended by the actor. Experiment 1 showed intensional and extensional events equally often; in experiment 2, extensional events were more frequent than intensional events.

The word orders showed signs of conventionalisation: over the rounds, word order became less conditioned on meaning. 7 of 12 dyads in experiment 1 converged on a single word order: all SVO. In experiment 2, 3 dyads converged on SVO word order, and 3 other dyads on SOV.

Experiments 3 and 4 were carried out with 2x8 groups of 8 participants. In round one, participants 1 and 2 were communicators, and 3 was an observer. Each consecutive round, one of the communicators left, the observer became a communicator, and a new participant became observer. Preliminary results show that even in this condition, where participants interact for a maximum of two rounds instead of six, convergence of word order is possible, and dependent on the frequency of event type.

Our experiments show that in silent gesture communication and transmission, semantically conditioned word order tends to disappear in favour of regular word order. The frequency of event types determines how regularisation progresses. This suggests that where pressures for naturalness and regularity are in conflict, languages start natural, but naturalness will give way to regularity as signalling becomes conventionalised through repeated usage.

Keywords: silent gesture, word order, interaction, iterated learning, language conventions



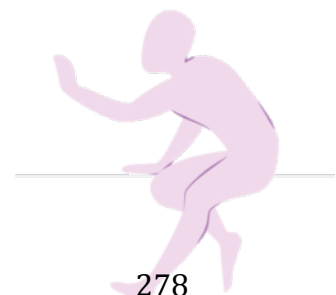
# Embodying sounds: Building and analysis of a database of gestural and vocal imitations

Hugo Scurto, Guillaume Lemaitre, Jules Françoise, Frédéric Bevilacqua, Patrick Susini, Frédéric Voisin

Institut de Recherche et Coordination Acoustique/Musique (IRCAM) – IRCAM – 1, place Igor Stravinsky  
75004 Paris, France

Describing a sound with words is a difficult task. It thus comes at no surprise that people rely importantly on body gestures and non-linguistic vocalizations (Lemaitre et al., 2014a). Previous studies have reported separate experimental results on vocal imitations or gestural description of sound. For example, vocal imitations have been found to reproduce the acoustical components of a sound within the constraints of the human voice (Lemaitre et al., 2014, 2015). Spontaneous gestural descriptions result in either mimicking the action that has produced the sound, or “tracing” the trajectory of some acoustic feature (Caramiaux et al., 2014). We consider here the combination of both vocal and gestural imitation. Such a process of sound imitation, as a multimodal phenomenon, remains mostly unexplored. Nevertheless, we believe that such imitation tasks should be linked to research in non-verbal communication (McNeill, 1992; Kendon, 2004). Our research is also related to recent approaches in the field of embodied music cognition (Leman, 2008), which highlights the role of the human body in our understanding of sound and music. We report on the building and initial analysis of a database of gestural and vocal imitations. Fifty French non-musician adult participants (29 female) imitated 52 unambiguously identifiable referent sounds. The referent sounds sampled across usual environmental sounds, basic mechanical interactions, and sounds of computer interfaces. Participants were instructed to imitate the sounds in such a way that somebody else could recognize them. In a first step, participants produced vocal imitations only; in a second one, they combined vocalizations and gestures. This resulted in a database of about 8,000 imitations consisting of audio and high-speed video files, tracking of body parts, and acceleration of the wrists. We annotated a subset of the videos, focusing on hand movements and shapes, and on the pieces of information that were specific to gesture or vocalization. We discuss (1) shared aspects of imitations across participants, (2) differences between strategies in vocalization and gesture, (3) accuracy of imitations, and (4) interaction between vocalization and gesture. We finally analyze motion-capture data in a more restrained but controlled experimental setup. Overall, our study highlights the metaphorical function of gestures combined with voice during sound imitation. Rather than simply following some acoustic feature, gestures expressively complement the vocalization and can indicate a salient perceived feature of a sound. These results are consistent with the idea of multimodal metaphors (Lakoff & Johnson, 1980; McNeill, 1992; Cienki, 1998).

Keywords: gesture, vocalization, sound, imitation, multimodality, metaphor



# Gesture - a visceral communication in the performing arts and beyond

Ami Shulman, Joseph Rován<sup>1,2</sup>

<sup>1</sup> Brown University [Providence] – Providence, Rhode Island 02912, United States <sup>2</sup> Institut de Recherche et Coordination Acoustique/Musique (IRCAM) – IRCAM – 1, place Igor Stravinsky 75004 Paris, France

We would like to discuss the visceral experience an audience has when they observe movement, and how this can be influenced by varying constructs of time and uses of 'pressure'.

We will devise 3 layers within this visceral experience: the notion of embodied knowledge; how time influences the embodied experience and the notion of 'pressure' as a way of creating meaning. Pressure is a form of visible tension in movement that can redefine what we see. For example, to make a tight fist reads very differently than to make the same shape with a soft hand as if to hold a tiny bird inside. Viscerally, we know the difference within this same movement, these differences are distinctions of pressure that give meaning. The perception of pressure is markedly affected by time.

We will be discussing each of these aspects based on the research from our artistic collaboration "Let us imagine a straight line" - an interactive video installation about the study of movement in relation to perceptions of time, space and consciousness - framed within the distinct and juxtaposing perspectives of the French philosopher, Henri-Bergson and the French physicist, Etienne-Jules Marey.

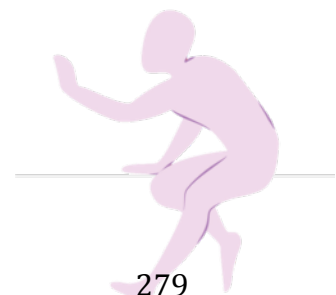
We often speak of gesture, alluding to signals and symbols that are recognizable and codifiable. But the visceral response we have to gesture is an embodied experience. It is an internal knowledge of a communication derived from an early apprenticeship of relating to ourselves and the environment, through movement. It is through this learning in the preverbal realm, that we are able to understand the subtleties of communication that transcend language. This internal recognition of another's movement, through our own experience, is the basis of how we read non-verbal communication and forms the foundation of the empathic response.

A deeper sense of meaning through pressure: from a kinetic perspective, pressure expands and contracts space. These distinctions in pressure are conveyed by intentionality in movement, affecting how space is occupied and for how long it is occupied. Observed differences in pressure influence the perceptions of time; relationship and therefore content.

There is an inextricable link between how pressure affects space through time and the kinetic intelligence of the body that is able to read this information and be affected by it. The mediums explored in our video installation work, through the lens of Bergson and Marey, affords a remarkable development to revealing these concepts.

We would be very happy to bring the installation as part of the conference.

Keywords: movement, embodiment, time, space, visceral, gesture, communication, empathy



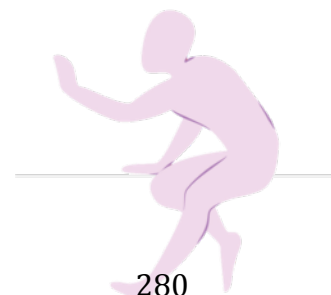
# Seeing How it Sounds: Observation, Imitation and Improved Learning in Piano Playing

Lilian Simones, Matthew Rodger, Franziska Schroeder

Queens University Belfast (QUB) – United Kingdom

Research in various fields has shown that students benefit from teacher's action demonstrations during instruction, establishing the need to better understand the effectiveness of different demonstration types, across student proficiency levels. This study centres upon a piano learning and teaching environment in which beginners and intermediate piano students (N=48), learning to perform a specific technique (staccato playing), were submitted to three different (group exclusive) teaching conditions: audio-only demonstration of the musical task; observation of teacher's action demonstration followed by student imitation (blocked-observation); and observation of teacher's action demonstration while alternating imitation of the task with the teacher's performance (interleaved-observation). Learning was measured in relation to both movement (range of wrist amplitude) and sound production (ratio of sound and inter-sound duration) before, during and after training. Observation and imitation of teacher's action demonstrations had a significant effect ( $p = .001$ ) on students' staccato knowledge retention at different times after training. Furthermore, students submitted to interleaved-observation presented significantly shorter note duration and larger wrist rotation and as such, were more proficient at the learned technique in each of the lesson and retention tests than students in the other learning conditions. There were no significant differences in performance or retention for students of different proficiency levels. These findings have relevant implications for both instrumental music pedagogy and other contexts where embodied action is an essential aspect of the learning process.

Keywords: Music teaching, music learning, demonstration, skill, observation, imitation



# A Brief Overview of Formal Body-Movement Annotations in Gesture Studies: From Schemes to Validation

Joanna Skubisz

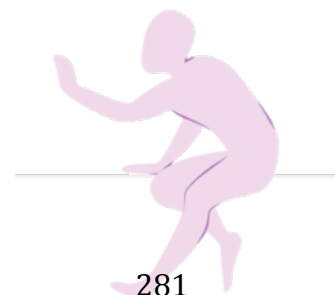
BlackBox Project, Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa (BlackBox, FCSH-UNL) – Portugal

Formal analyses of human movement are intended to be - by nature - objective. Despite the great interest in Gesture Studies of describing gesture and other body movement forms, there is no one standardized guideline for the formal transcription nor annotation of body movements. Thus, scientists are left to adapt versions of pre-existing annotation schemes or develop their own. This paper aims at providing an overview of the gamut of annotation schemes used in the multimodal communication literature in order to raise questions about how researchers define, treat and analyze body movements in their data. Differences of definitions cause problems when it comes to comparing research findings and are directly connected to the question of how body movement units are identified and classified by the research community. On the one hand, there is the problem of formal and functional labeling that are often collapsed in the adopted annotation scheme; on the other, definitional diversity affects human raters' evaluation and judgment, not to mention differences in the annotation process when marking start- and end-points of a movement unit.

Another issue is that human movement is often studied in a fragmented manner, where researchers (without blame) focus only on certain articulators and not others. Whereas manual gestures are most studied within the field, and some attempts have been undertaken for its standardization (inter alia Bressemer, Ladewig, & Müller 2013; Lausberg & Sloetjes 2009), a structured annotation guideline for other articulators' expressions has yet to be reached (cf. "head-gestures annotation schemes": Kousidis 2013; Poggi 2010; Heylen 2008; Cerrato 2007; Allwood & Cerrato 2003). Consequently, a comprehensive annotation scheme containing all body articulators is unavailable to gesture researchers, although within the performing arts domain we find an example of that type (i.e. Laban movement analysis and notation).

Besides the problems of defining the movement units and the segmentation issues, researchers also face obstacles in processing the data and the estimation of their reliability and validity. Already the widely used statistical coefficients for the measurement of inter-rater agreement (i.e. Fleiss' kappa, Krippendorff's alpha, Cohen's kappa), are problematic for this field (McHugh 2012) and are not always included in the statistical evaluation exactly. Some researchers claim that a statistical calculation of agreement is not mandatory (e.g. Stelma & Cameron 2007). This presentation intends to provide more questions than answers, but at the same time provide suggestions to scientists tackling the questions of how to perform formal studies of human movements.

Keywords: annotation schemes, interrater agreement, gesture form, standards, data reliability





# Markers of communicative intent through ostensive signals and their effectiveness in multimodal demonstrations to adults and children

Anita Slonimska<sup>1</sup>, Aslı Özyürek<sup>2,3,4</sup>, Emanuela Campisi<sup>5</sup>

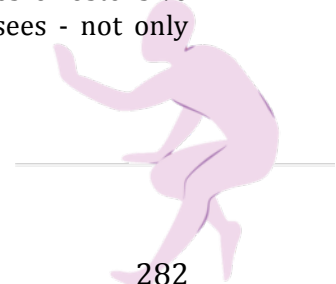
<sup>1</sup> Radboud University – Netherlands <sup>2</sup> Center for Language Studies, Radboud University Nijmegen (CLS) – Netherlands <sup>3</sup> Donders Institute for Brain, Cognition and Behaviour – P.O. Box 9101 6500 HB Nijmegen The Netherlands, Netherlands <sup>4</sup> Max Planck Institute for Psycholinguistics – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands <sup>5</sup> Lund University [Lund] – Paradisgatan 2 Box 117, SE-221 00 Lund, Sweden

In face-to-face interaction people adapt their multimodal message to fit their addressees' informational needs. In doing so they are likely to mark their communicative intent by accentuating the relevant information provided by both speech and gesture. In the present study we were interested in the strategies by which speakers highlight their gestures (by means of ostensive signals like eye gaze and/or ostensive speech) for children in comparison to adults in a multimodal demonstration task. Moreover, we investigated the effectiveness of the ostensive signals to gestures and asked whether addressees shift their attention to the gestures highlighted by the speakers through different ostensive signals. Previous research has identified some of these ostensive signals (Streeck 1993; Gullberg & Kita 2009), but have not investigated how often they occur and whether they are designed for and attended to by different types of addressees. 48 Italians, born and raised in Sicily, participated in the study. 16 chosen Italian adult participants (12 female, 7 male, age range 20-30) were assigned the role of the speakers, while other 16 adults and 16 children (age range 9-10) had a role of the addressees. The task of the speaker was to describe the rules of a children's game, which consists of using wooden blocks of different shapes to make a path without gaps. Speakers' descriptions were coded for words and representational gestures, as well as for three types of ostensive signals highlighting the gestures – 1) eye gaze, 2) ostensive speech and 3) combination of eye gaze and ostensive speech to gesture. Addressees' eye gaze to speakers' gestures were coded and annotated whether eye gaze was directed to highlighted or not highlighted gesture.

Overall eye gaze was the most common signal followed by ostensive speech and multimodal signals. We found that speakers were likely to highlight more gestures with children than with adults when all three types of signals were considered together. However, when treated separately, results revealed that speakers used more combined ostensive signals for children than for adults, but they were also likely to use more eye gaze towards their gestures with other adults than with children. Furthermore, both groups of addressees gazed more at gestures highlighted by the speakers in comparison to gestures that were not highlighted at all.

The present study provides the first quantitative insights in regard to how speakers highlight their gestures and whether the age of the addressee influences the effectiveness of the ostensive signals. Speakers mark the communicative relevance of their gestures with different types of ostensive signals and by taking different types of addressees into account. In turn, addressees - not only adults but also children – take advantage of the provided signals to these gestures.

Keywords: gesture, recipient design, ostensive signals, eye gaze, ostensive speech



# Dialogical catchments in instructional interactions

Tetyana Smotrova

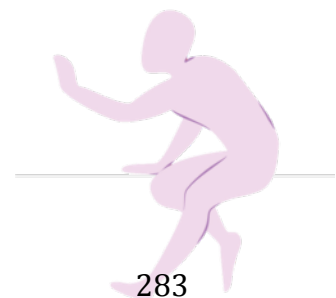
National University of Singapore (NUS) – 21 Lower Kent Ridge Road, Singapore 119077, Singapore

Catchments, defined by McNeill (2005) as repetitively occurring gestural features that share one or more common quality, have been shown to play an important role in discourse by serving as cohesive devices that reflect common themes and discourse segments. Despite their important discursive functions, catchments have rarely been the central focus of analysis. Current research on catchments (e. g., McNeill, 2001; Montredon et al, 2008; Pozzer-Ardenghi & Roth, 2008) predominantly examines monological aspects of catchments without due attention to their dialogical functions in naturally occurring interactions (but see Smotrova & Lantolf, 2013). Dialogical catchments have been shown to be commonly used in such contexts as instructional interactions (Smotrova & Lantolf, 2013; Zhao 2007); however, their specific functions remain largely under researched. This study investigated the functions of dialogical catchments in instructional interactions occurring in a language classroom. The study employed McNeill's (2005) gesture analysis to investigate dialogic catchments that emerged as teacher-student imitations of each other's catchments. These were observed in naturally occurring dialogic interactions between the teacher and students in an English as a Second Language (ESL) classroom. The study analyzes transcribed excerpts of classroom videos drawn from a 30-hour corpus of recordings made in an intensive English program at an American university. The participants were adult beginning-level students in a reading class and their native speaking instructor.

Results suggest that dialogic catchments played an important role in the instructional interactions by serving a range of functions. First, they extended coherence of classroom discourse and thinking across multiple speakers. Second, they functioned as a means of achieving shared understanding, where student catchments served as a sign of better understanding, while teacher catchments served as an acknowledgement/confirmation of student response. In contrast, the absence of catchments signaled divergent understandings and cognitive misalignment. Third, dialogic catchments contributed to building rapport and affective alignment between the teacher and students. Results also point to more specific criteria for identifying catchments, where gestures considered as catchments need to share the element of form that reflects the core meaning of the concept in question and can differ in non-essential elements that do not affect the core meaning of the concept.

The study has implications for gesture research as it elaborates the notion of catchments by expanding the focus from monological to dialogical aspects of their usage in naturally occurring interactions. It also contributes to the methodology of gesture studies by specifying the criteria for identifying catchments. These criteria reflect a dialectic of the stable and variable, which makes catchments a versatile communicative and instructional resource.

Keywords: catchment, classroom interaction, L2 learning



# Tracing the Development of Spatial Grammar in the Manual Modality: Non-signing children use spatial device in their gestures

Wing Chee So, Kit-Yi Miranda Wong

The Chinese University of Hong Kong (CUHK) – Hong Kong SAR China

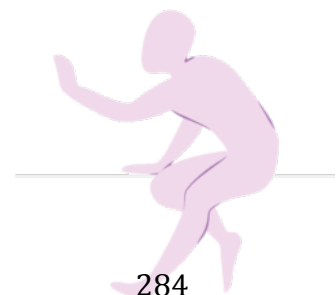
Signers employ spatial devices to indicate non-present referents. They produce signs in non-neutral locations (i.e., spatially-modulated signs) and maintain the spatial locations for the referents throughout the discourse (i.e., establishing shared reference). Children signers introduce spatial devices in their signs as early as age five (Loew, 1984; Lillo-Martin et al., 1985). Abundant research has also shown that adult speakers can identify non-present referents by gesturing in non-neutral locations (e.g., pointing to the left for a toy car) and maintain the same spatial locations in order to establish shared reference, suggesting that using spatial devices to introduce and refer back to referents are fundamental to language in the manual modality (Gullberg, 1998, 2003, 2006; So, et al., 2005; So, et al.; Yoshioka, 2008).

The present study traced the origin and development of the seeds of spatial devices in the manual modality by examining whether non-signing children could produce spatially-modulated and shared-reference gestures as early as age five (like children signers) and tracking the developmental changes of the use of spatial devices in gestures from age five to eleven. Finally, we explored whether such use was associated with children's cognitive skills such as verbal and spatial memory as well as eductive reasoning (abilities to extract information from a complex situation).

We administered a demonstration task (So et al., 2015) to three groups of children, aged 5 to 6, 7 to 8, and 9 to 11, respectively (N=15 in each group). In this task, an experimenter orally described activities in daily life that involved non-present objects with gestures. All of the non-present objects were assigned to specific spatial locations established by the experimenter. All children were asked to show and tell the activities. If they introduced spatial devices in their gestures, they would gesture the objects at the specified locations. We also administered three cognitive tasks to assess their spatial memory, verbal memory, and eductive reasoning.

Our results showed that, similar to signers, non-signing children could introduce spatial devices in their gestures from as early as age five. However, five- to six-year-old children produces significantly fewer spatially-modulated gestures,  $F(2,42)=3.99$ ,  $p<.03$ , and fewer shared-reference gestures,  $F(2,42)=4.46$ ,  $p<.02$ , than seven- to eight-year-old and nine- to eleven-year-old children(see Figure 1). There was no difference between the two older groups of children. The ability to produce shared-reference gestures was positively correlated with their verbal memory and eductive reasoning but not spatial memory. Verbal memory and eductive reasoning were significantly correlated. Several regression analyses were conducted to establish mediation between verbal memory and eductive reasoning. We found eductive reasoning mediated the effect of verbal memory on the production of shared-reference gestures, suggesting that eductive reasoning is the drive of producing shared reference gestures.

Keywords: Gesture, Spatial grammar, Resilience, Non, signing children



# When does a nod mean "Yes"? The timing of back-channel head gestures during narration

Matthew Stave, Eric Pederson

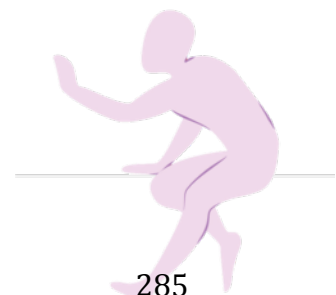
University of Oregon (UO) – United States

Head nodding is mentioned early on from the point of view of kinesics (Birdwhistell 1970) and as a backchannel behavior (Schegloff 1982, Duncan 1975, Goodwin 1986). More recently, there has been more in depth exploration of head nod behavior: Iwano et al. (1996) explores the function of different head motions, while Maynard (1986, 1987) and Kita (1998, 2007) look at the integration of head nods with verbal Japanese back channel behavior. Kogure (2007) also looks at the use of nods with other non-verbal behavior such as gaze coordination. None of these previous studies precisely examine the temporal relationship between listener head nods and other speaker and listener behaviors. Most of the literature on the timing of speaker- listener interactions focuses on the verbal aspects of turn-taking rather than head gestures, e.g., Fusaroli & Tyl'en (2015) and Stivers et al. (2009). Ishi et al. (2014) examine the synchronization of speaker head nods in Japanese speech and Louwerse et al. (2012) examine the co-occurrence of head nods for both speaker and listener (among other behaviors), but neither of these studies examine the relationship between head nods and other behaviors.

This paper reports on initial data collected from 10 narratives in English taken from dyad conversations using both video recording (for precise spatial descriptions) and Kinect recording (for 3-D motion tracking). All head movements, changes in gaze direction, speech/vocalizations, and manual gestures were coded for both speaker and listener. All listener nods were sorted into longer ( $> 1133\text{ms}$ , the longest tertile of all instances) and shorter ( $< 591\text{ms}$ , the shortest tertile) nod behavior. We compared these listener nods with each of the four categories of preceding (within  $-500\text{ms}$  to  $+1500\text{ms}$ ) speaker behavior.

Listener nods are not triggered by speaker manual gesture (only 24% of listener nods follow within 1.5 seconds of the offset of speaker manual gesture). Short nods predominantly follow speaker head gesture offset (94% of instances). Long nods have seem to roughly equally follow speaker speech (45%), head gesture (63%), and gaze toward the listener (69%). This suggests that short (and mostly single) nods may be largely in response to what the speaker is saying, while longer (and mostly multiple) nods respond to multiple speaker behaviors. Current work is investigating to what extent this timing of listener nod behavior indicates function. For example, can we determine that a listener head nod following speaker's speech offset is typically an affirmation of content whereas a nod during speaker's speech is an indication of attention or other interactive information? The former is presumably a more consciously guided activity and depends on semantic processing of the speaker's speech. The latter is presumably a largely automatic response and can be more closely linked to speaker non-verbal behavior.

Keywords: interaction, timing, head gesture, nod



# A multimodal Embodied Construction Grammar approach to image schematic structure in metaphoric gesture

Elise Stickles

University of California, Berkeley – United States

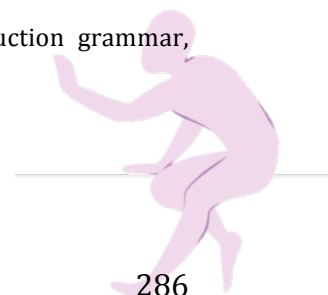
We demonstrate that metaphoric gestures systematically iconically evoke specific aspects of the source domain image schemas underlying inferential structure in conceptual metaphors. This form/meaning relationship leads to a multimodal approach to metaphor in construction grammar. Image schemas (Johnson 1987; Lakoff & Johnson 1999) have been shown to be the iconic structures in concrete and abstract gestures (Cienki 2005, 2013). Work on metaphoric gesture has focused on concept construal (e.g., Calbris 2003); less is known about how abstract gestures evoke metaphors. We use a corpus approach to identify the salient features represented by these gestures, and then incorporate them into a multimodal Embodied Construction Grammar (Feldman, Dodge, & Bryant 2009) analysis. We constructed a corpus of American English metaphoric gestures from the TV News Archive (<https://archive.org/details/tv>) and UCLA NewsScape Archive (<http://newsscape.library.ucla.edu/>). Captions were searched for metaphoric usages of common manner and path verbs. Relevant data included a metaphor with a motion source domain in both gesture and co-speech (Figure 1). Linguistic and gestural annotations included metaphor, path direction, and manner of movement (e.g. CYCLE, STRAIGHT).

The spoken metaphors were analyzed by identifying the closest entry in the MetaNet metaphor repository (Dodge et al. 2015), which includes both the structure of image schemas/frames and the mappings between source and target domain elements. This specifies which frame elements carry inferences. For example, oil prices dropped evokes the metaphor DECREASE IN QUANTITY IS DOWNWARD MOTION. Inferences derive from the nature of the vertical, linear path and movement along it; the core elements of the source domain participating in the metaphor are the PATH of the vertical axis and STRAIGHT motion.

Comparison between the gestural image schemas and parallel linguistic expressions reveals that the gestural form represents the image schemas conveying metaphorical inferences. To illustrate, the linguistic form may evoke a frame which, on its own, is associated with a very different iconic structure. For instance, the literal sense of ‘run’ might be iconically represented as a traced path or the pumping arms of a jogger. In contrast, when run is used metaphorically (the pipeline will run from Canada to the Gulf Coast) the gesture reflects only the PATH image schema of the metaphor (Figure 2).

This relationship between metaphoric gesture form and meaning can be incorporated into construction grammar analyses, as proposed in Figure 3. The iconicity of the gesture’s form is conceptually bound to that of the image schema it perceptually evokes. This binds in turn to the co-referential meaning of the linguistic form conceptually evoking a frame which encompasses that same schema. Together they evoke a shared conceptual metaphor, whose meaning is that of the whole construct.

Keywords: image schema, conceptual metaphor, metaphoric motion, multimodal construction grammar, gesture corpus



# Auto-poetic gesture

Jurgen Streeck

The University of Texas at Austin (UT Austin) – Whitis Ave Austin TX 78712, United States

In my presentation I respond to the theme of the conference by presenting and illustrating a conception of gesture as auto-poesis, as a speaker's autonomic, self-organizing bodily response to a situational stimulus and as a medium of the acting body's ongoing self-organization. This view of gesture draws on Merleau-Ponty's gestural theory of language as much as on the 'radical embodiment' perspective advanced, for example, by Jonas (1966, Sheets-Johnstone (2012), and Thompson (2007), among many others, and it investigates the creativity of gestures in their adaptive moment-to-moment emergence in everyday interaction. Auto-poesis of and by gesture is shown in this presentation within two contexts: in a variety of very simple conversational (conceptual) gestures that involve a closing of the hand; and in freestyle hip hop battles where rappers' arms and hands are at the core of the self-organization of linguistic creativity. The auto-poetic quality of gestures in these environments is demonstrated in light of their temporality, and their role in conceptualization is investigated in light of the action schemata that they constitute.

## Literature

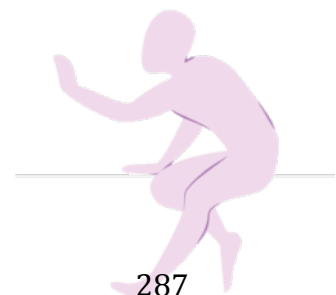
Cuffari, E. & J. Streeck. Taking the world by hand. How (some) gestures mean. In Meyer, C., Streeck, J. & J.S.Jordan. Intercorporeality: Emerging Socialities in Interaction. Oxford University Press. forthcoming.

Jonas, H. (1966). The Phenomenon of Life. Toward a Philosophical Biology. Chicago: Chicago University Press.

Sheets-Johnstone, M. (2012). The Primacy of Movement (2nd Edition ed.). Amsterdam: Benjamins.

Streeck, J (2015). Embodiment in human communication. Annual Review of Anthropology, 44, 419–38  
Thompson, E. (2007). Mind in Life. Cambridge: The Belknap Press of Harvard University Press.

Keywords: self, organization, conceptual gesture, creativity, interaction





# When an instruction ends: the role of bodily demonstrations in learning orchestral conducting

Chiho Sunakawa <sup>1,2</sup>

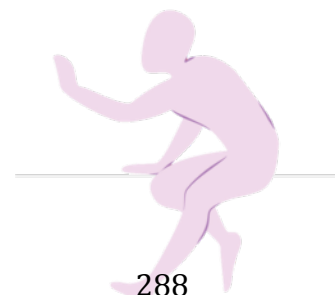
<sup>1</sup> Japan Society for the Promotion of Science (JSPS) – Japan <sup>2</sup> National Institute of Informatics (NII) – Japan

This paper aims to discuss how instructions and instructed actions are mutually organized in the course of classroom interaction between a teacher and student orchestral conductors. Focusing on the sequential and multimodal organization of participants' talk and bodily behaviors, I investigate how instruction is negotiated both by the teacher and the student. More specifically, I analyze how the timing of a teacher's bodily demonstration in instruction is coordinated with talk and the student's embodied compliance. As an analytical departure, I follow ethnomethodological studies on instruction (e.g. Garfinkel 2002, Suchman 1987, Mondada 2014) and consider instruction to be an activity that directs someone to do something. From this perspective, directives include not only grammatical imperatives, but also other forms of "instructional first actions" (Szczepek Read et. al. 2013; 26) that structure the recipient's following action in a particular way. In the context of learning body-centered activities such as dance (Keevilik2010), singing (Szczepek Read et al 2013), and orchestral conducting, the transition from an instruction to its compliance involves a complicated negotiation between participants' talk and bodily behaviors. In orchestral conducting class, when the teacher interrupts the music and initiate instructions, his directives are frequently followed by bodily demonstrations. Thus, the grammatical completion of imperatives does not always projects the end of an instructional turn and initiates a relevant response. Then the questions arise: How do participants know when an instructional unit ends? How do students comply with the given directive? To address these issues, I analyze the process in which the teacher and student's bodily demonstrations become resources for completing an instructional turn.

One example involves what Hosoma (2009) may call an "extended gesture," namely gestures held beyond the speaker's initial utterance. The teacher decomposes his instruction into several directives, such as "try this," "now let your hands take in air," "more tension," and "now make it half that size," each of which is followed by a bodily demonstration. Interesting to note is that during the consecutive insertion of directives, the position of the teacher's hands is located in the space in front of the chest. This suggests that the teacher's hand position has not been retracted, thus the end of the teacher's instruction has not arrived yet. The teacher's hand position returns to a rest position when he accepts the student's demonstration of the directives. In other words, these multiple verbal directives are not just multiple, independent "local directives" (Szerec Read) that make immediate compliance relevant, but mutually constituted to form a single instruction unit through which participants are oriented to the production of a better performance.

Through turn-by-turn, analyses of such teacher-student interactions, I discuss how participants coordinate temporality of the body and talk in learning orchestral conducting.

Keywords: orchestral conducting, music, demonstration, instruction



# EXTENDING A FOREFINGER: ONE WAY TO PUBLICLY INDEX A CORRECTIVE ACTION

Hanna Svensson

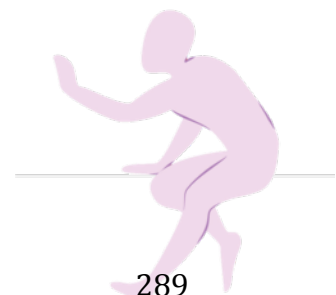
University of Basel – Switzerland

This paper investigates a particular embodied feature of other-initiated repair doing correction (Schegloff & Jefferson & Sacks, 1977) in an institutional multi-party setting: extending the index finger vertically, the palm turned away from the body of the speaker. Within the framework of Conversation Analysis the extended forefinger has been demonstrated to be mobilized by participants to accomplish a variety of actions such as counting (Schegloff, 1984) and pointing (see Goodwin, 2003; Mondada, 2013; 2014), the action it accomplishes depending on the larger context and, more importantly, the sequential positions in which it is produced. Along another line of research, gesture studies has described the hand configuration described above as "corrective" (see for example Calbris, 2011 and Demers & Bérubé, 1995), and a Google search provides manifold lay definitions of it, such as being 'rude', 'impolite' or doing 'teaching'. The way in which corrective action is accomplished in a situated way through complex embodied compositions, in the course of institutional interaction, remains however understudied.

This study, analyzing naturally occurring interactions, is based on extensive video documentation of a participatory democracy project in urban development (about 50 hours audio- and video recordings) regarding the transformation of an old military site into a public park. Citizens are invited to attend information meetings and brainstorming workshops mediated by a moderator who is in charge of the organizational aspects of the meetings, the distribution of information and the expression of ideas and opinions relevant for the project. The participants are continuously concerned with the issue of addressing multiple parties with different degrees of and access to relevant knowledge, which is achieved through a variety of practices (Mondada, 2015) – one of them being other-initiated repair (Svensson, 2015a; 2015b).

This conversation analytic study explores one of the resources the participants mobilize to make an action recognizable as publicly doing a correction, namely that of extending the forefinger in a specific gestural composition, in a specific sequential environment, finely coordinated with the unfolding turn at talk. The public character of the correction displays the participants' orientation to the incessant negotiation and management of shared knowledge – and its relevance for achieving the institutional task at hand.

Keywords: Conversation Analysis, Institutional Interaction, Repair, Intersubjectivity, Multi Party Interaction



# Combining Gesture Studies and Theatre Translation: a hands-on Approach

Angela Tarantini

Monash University – Australia

The aim of my paper is to apply some of the findings of gesture studies scholars to the actual practice of the translation 'for the stage', hoping to shed light on some long-debated issues in the area of theatre translation. Ever since scholars started to write about stage translation (as opposed to page translation), notions such as performability and gestic subtext have been central to the discipline, even though these issues have recently "fallen into disgrace" (Bigliazzi, Kofler, & Ambrosi, 2013, p. 8).

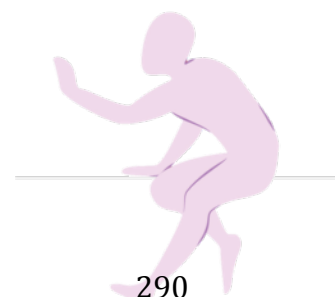
Researchers in theatre translation have often speculated about the existence (or lack thereof) of a gestic subtext 'encrypted' within the playtext (Bassnett-McGuire, 1981; Bassnett, 1985, 1998, 2014; Bigliazzi et al., 2013; Pavis, 1992; Pavis & Biller, 1981, among others), and about the potential (or lack thereof) to anticipate the nonverbal elements which constitute "the discourse or grammar of the performance" (Johnston, 2004, p. 28). However, the opposition verbal/nonverbal is a fallacious one, as discourse analysts and researchers in gesture studies have cautioned us (Herman, 1995, 1997; Kendon, 2000; McNeill, 1985; McNeill & Duncan, 2000, among others).

According to Pavis (1989), it is the translator's responsibility to identify how the different semiosis interact in the source language, and to transfer those dynamics onto the target stage. With this paper I aim to show that the combination of different theoretical frameworks, such as gesture studies and studies on intonation (Brazil, 1985), can be vital to bring a new perspective on the issue of gestic subtext, which has been object of debate in translation studies for decades.

Taking a single case study as an example, an ongoing drama translation project, I aim to demonstrate how it is possible for the translator (to a certain extent) to infer the 'nonverbal' (gestural) elements of the performance, and how such awareness may ultimately influence translation choices.

I start from the assumption that the task of the translator is not to translate 'just' the words on the page, but rather to retrace the path to the Growth Point from which both speech and gesture unfolds (McNeill, 2000). Adapting Kershaw et al.'s methodology of Practice as Research (Kershaw, Miller, Whalley, Lee, & Pollard, 2011) to the actual practice of theatre translation, I wish to test the hypotheses I formulated on the relative predictability of gestures while approaching the translation of the playtext from a theoretical perspective. The rehearsal room with professional actors then becomes a kind of laboratory, and since the actors are unaware of what the translator wants to elicit, the result is unlikely to be biased.

Keywords: Theatre translation, gesture studies, practice as research



# Doing demonstration as situated practice

Burak S. Tekin

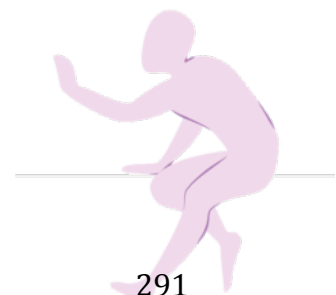
University of Basel – Switzerland

Based on video recorded sessions of participants' motion based video gaming activities, this paper investigates how participants deal with game related troubles. More specifically, within a perspective informed by ethnomethodology (Garfinkel, 1967) and conversation analysis (Schegloff, 2007), this study describes different ways gamers ask for help when they confront with a difficulty within the game, and how other participants respond by providing bodily demonstrations. The phenomenon pursued here is the reflexive relationship between the practice of asking for help (from gamers' perspectives) and the practice of doing demonstrations (from spectators' perspectives). In motion based video gaming activities, the gaming experience is profoundly dependent on the correct bodily production of the certain movements. Failing to do so may generate troubles for gamers to proceed in the game. Upon the gamers' asks for help, the spectators may provide bodily demonstrations, the embodied displays of how the bodies need to perform the specific gaming movements, often contrasting right and wrong aspects (see Keevallik, 2010). Deictic expressions along with other multimodal resources such as pointing gestures, embedded within the demonstrations, are deployed to evidence the issues in contrast (see Goodwin, 2007). The overall organization of doing demonstrations necessitates the restructuring of the two interdependent worlds, in vs. off the game (Mondada, 2012).

This paper examines two interactional ways of doing demonstrations. On the one hand, the gamers may turn back to the spectators watching the game by disengaging from the gaming space and initiating a new interactional space (Mondada, 2009) in which the co-participants are mutually oriented. In doing so, they tacitly ask for help. Within their demonstrations to which gamers closely attend, spectators provide instructions, both positive and negative, by juxtaposing various multimodal resources (talk, body positionings, pointing gestures, reciprocal gazes, gesticulations). On the other hand, the gamers may remain concentrated on the screen, and announce the troubles verbally without engaging in reciprocal contact with the others. This time, the demonstrations of the spectators become only audibly available to the gamers, not visually. These demonstrations are adjusted to the lack of mutual orientation, and are often formatted within shorter or unfinished turns.

Through the sequential and temporal inspection of these interactional practices, this paper explicates that demonstrations are a) accomplished in situ as interactions unfold, b) enabled by mutual bodily orientations, and c) configured by the juxtaposition of various multimodal resources. Therefore, it contributes to our understanding of both the organization of gaming activities and the organization of embodied participation in human social life.

**Keywords:** Conversation analysis, talk and embodied conduct in interaction, mutual orientation, space in interaction, bodily demonstrations



# The relationship between sign production and sign comprehension: what the hands reveal

Robin Thompson, Richard Atkinson

University of Birmingham, Psychology, Multimodal Multilingual Language Processing Lab (UoB) – United Kingdom

During spoken language processing the same perceptual feedback system is used for speech comprehension when listening to another person's output, and during speech production when monitoring "self-output". For sign language processing, visual input when comprehending another person's signing is distinct from visual input from one's own signing and, further, while there is proprioceptive feedback during sign production there is no proprioceptive feedback during comprehension. Very little is known about how signers monitor their own production, or the relationship between sign production and sign comprehension. Initial research suggests that sign comprehension relies on vision, while sign monitoring during production relies more on proprioceptive feedback (Emmorey, et.al., 2009; Emmorey, et.al., 2009).

We investigate the relationship between sign production and comprehension, using the fact that signers have two primary articulators (hands) and can differ in which hand is their dominant articulator. Specifically, we ask if hand dominance (right or left) during sign production influences comprehension of signs produced with the same (congruent) or different hand (incongruent). We explore two possibilities: 1) Perceptual input drives comprehension More frequent exposure to right-handed signers (approximately 85% of signers) results in a perceptual frequency effect with all signers (left- and right-handed) faster to comprehend right-handed signers. 2) Sign production is tied to sign comprehension. There is a relationship between production and comprehension systems with right-handed and left-handed signers faster to comprehend congruent (same-handed) signs.

Methods: British Sign Language sign participants decided whether a picture followed by a sign video matched (120 match trials, 120 mismatch). Sign stimuli (balanced across one-handed, two handed signs with same handshapes, and two-handed signs with different handshapes) were created using two left-handed, and two right-handed sign models. Each participant (10=left-handed, 22=right-handed; 13 native signers, all deaf) saw each sign produced by only one of four models with congruent/incongruent signing hand balanced within each experiment and across participants.

Results: The data reveal a 3-way interaction: Sign-Type x Model-Handedness x Participant-Handedness ( $p=.006$ ). Examining left- and right-handed participant groups separately indicates right-handed participants are faster when making decisions about right-handed (congruent) signs (main effect of Model-Hand,  $p=.001$ ), while left-handed signers are only faster for left-handed (congruent) signs that are 2-handed (same or different handshapes). For 1-handed signs they are faster for right-handed models: Model-Hand x Sign-Type interaction ( $p=.03$ ). Overall the results indicate a tight relationship between production and comprehension systems for signers such that the dominant hand used for production is privileged during comprehension. However frequency of exposure is also relevant with left- and right-handed signers faster to recognize

1-handed signs from right-handed models. Results suggest a model of sign monitoring in which action systems used during production are active during sign comprehension, but also a model in which perceptual input plays an important role.

Keywords: sign language production and comprehension systems

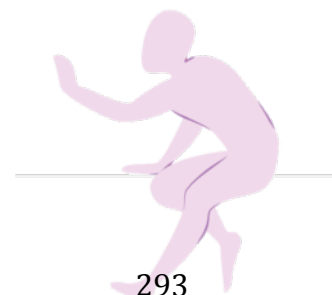
# Referential gestures and physical actions: A form-based analysis

Yao Tong<sup>1</sup>, Alan Cienki<sup>2</sup>

<sup>1</sup> Vrije Universiteit Amsterdam [Amsterdam] – De Boelelaan 1105 1081 HV Amsterdam, Netherlands <sup>2</sup> VU University and Moscow State Linguistic University – Netherlands

Spontaneous co-verbal gestures are claimed to be motivated by, and further abstracted from, our everyday actions (e.g., Ladewig, 2014). The formation of a gestural form-meaning pair goes through the stage of conventionalization and schematization, during which physical motion and action patterns are projected onto gestures and the hands are freed from actually manipulating objects (e.g., Ladewig, 2014; Mittelberg, 2014). However, it is not yet clear how exactly the gradual processes of schematization take place, namely, in what ways gestures exploit the schemes of physical actions. The current research aims to answer the following research question: To what extent are the form features of physical actions modulated during their transformation into spontaneous referential gestures depicting concrete actions and further into those depicting abstract actions? Using manual action words (e.g., pull, push, lift, pick, hold) as a point of departure, a form-based analysis is conducted on three groups of corpus data: (1) actual object manipulation manual actions (e.g., the speaker is talking pulling a rope while actually pulling it); (2) spontaneous co-verbal gestures depicting concrete actions (e.g., the speaker is talking about pushing a button on plane); (3) spontaneous co-verbal gestures depicting metaphoric (thus more abstract) actions (e.g., the speaker is talking about someone pushing the limit in a political debate). All the data are collected from the Distributed Little Red Hen video database (<https://sites.google.com/site/distributedlittleredhen/home>), which allows for the search of relevant words and phrases through its closed-captioning that is recorded with a large number of American televised programs (250,000 television programs with some programs dated back to March 2004). The gesture coding focuses on the form features which might be able to capture a wide range of the form variation and modification of the physical actions and gestures. A coding scheme involves fine-grained categories of hand shape, tension (in handshape), orientation, location in space, movement trajectories (Bressem, Ladewig, & Müller, 2014). A preliminary observation from a small data set (currently at 40 clips and continually being enlarged) shows that gestures depicting abstract manual actions are less varied, more recurrent in nature, and reduced in several form parameters, compared to physical manual actions and gestures depicting concrete manual actions. For instance, gestures depicting abstract manual actions are featured with less tense handshapes as well as smaller personal spaces. The current research might shed light on degrees of iconicity represented in form features of different gestural variants, showing how physical actions bring iconic structures to spontaneous co-speech referential gestures.

Keywords: referential gestures, physical actions, form features, schematization, degrees of iconicity





## Thought made visible

Barbara Tversky, Valeria Giardino , Azadeh Jamalian , Melissa Bradley , Juliet Chou , Andrea Kantrowitz , Seokmin Kang , Eliza Bobek, Angela Noel

Columbia/Stanford – United States

Gestures are created by tools we have with us always, but they are fleeting and disappear. Sketches require a surface and a writing implement but they remain in view to be contemplated and considered. Sketches can be viewed as frozen gestures and gestures as fluid sketches. Often, they are used together, with fluid gestures animating frozen sketches. We describe research that reveals similarities in their means of expression. One common example is points, virtual or actual. Points on a page or in the air can represent places in the world, people in social networks, ideas in a knowledge map; in short, anything that is readily conceived of as point-like. A second common example is lines, virtual or actual, between points representing relations of any kind. Integrated sequences of gestures, like sketches, can be used to create models of complex ideas and in so doing, promote understanding of those ideas. These results and others are evidence that gestures and sketches express thought more directly than words, which primarily bear arbitrary symbolic relations to thought.

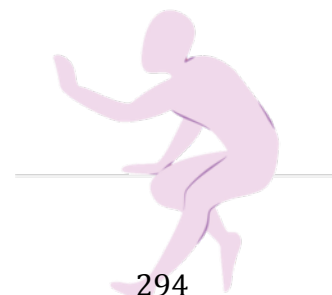
We are studying the roles of gesture and of sketches, those produced for self and those produced for others, in learning, thinking, problem solving, discovery, and creativity. Precise gestures and sketches naturally convey precise ideas; as such, they are ideal for learning and problem solving. But discovering and creating new ideas seem to rely on messiness. Messy sketches can be reconfigured and reinterpreted, requisites for new ideas.

Several projects show that gestures can reveal and change thought in self and other. In one project, seeing specific kinds of gestures altered people's conceptions of time; in another, seeing gestures that conveyed action rather than structure enhanced people's understanding causality of a complex system. Other projects show that gestures for self can create models that structure problems and enhance comprehension, memory, inference, and problem solving.

Turning to sketching, one project shows that students' sketches of scientific processes improve their understanding and learning. Another project is revealing how people get new ideas from ambiguous sketches and uncovering ways to enhance that process. A third project is revealing ways that artists get new ideas from their own sketches.

These representations of meaning expressed in gestures and sketches constitute a different way of thinking termed *spraction*, actions in space that create abstractions.

Keywords: gesture, sketch, comprehension, problem solving, creativity



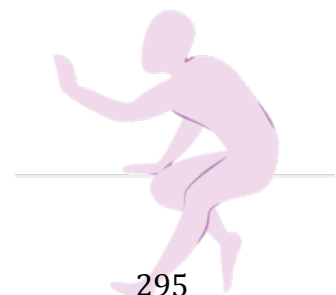
# The influence of babble noise and augmentative signs on vocabulary learning by adults and children

Lian Van Berkel-Van Hoof

Behavioural Science Institute, Radboud University (BSI) – Montessorilaan 3 6525 HR Nijmegen, Netherlands

Multimodal stimuli have been shown to aid vocabulary learning for typical populations (e.g., Goldin-Meadow & Alibali, 2013; Kelly, McDevitt, & Esch, 2009; Tellier, 2008). Most research has, however, focused on a relatively rich context, in which the learner had to acquire a new label for a known concept. Furthermore, previous research has often dealt with learning under ideal listening circumstances. A recent study, however, showed that when there is little context (i.e., a new label for a new concept), typically developing (TD) children do not benefit from an augmentative sign, whereas Deaf/Hard of Hearing (DHH) children do (van Berkel-van Hoof, Hermans, Knoors, & Verhoeven, submitted). It is unclear whether these groups differ because the DHH children are more attuned to visual input because of their hearing impairment, or because a degraded speech signal causes people (both hearing and (D)deaf) to tune in on visual input. The present study further elaborates on these issues by degrading the speech signal and testing adult participants with normal hearing and TD children in a condition with babble noise. The participants in the present study learned new words for new concepts in one of two within-subject conditions: word+picture+sign and word+picture, OR word+picture+sign in babble noise and word+picture in babble noise. The first two conditions are similar to previous research, but with a novel object as well as a novel word. The babble noise conditions were added in order to simulate adverse listening conditions. Participants received a training on day 1, a test of passive word knowledge followed by a training on days 2 and 3 another test of passive word knowledge on day 4. Day 4 also included Working Memory tests. Results of the children show a main effect measurement: they learned more words as time progressed. There was no effect of sign (with or without sign, within subject) or group (with or without noise, between subject). The adults in the no-noise condition, on the other hand, did show a main effect of sign, as well as an effect of measurement: The participants correctly recognised more words in each measurement and they remembered more words that had been taught with a sign than those without one. Data of adults in the noise-condition and the Working Memory data will be analysed before the conference. The results so far suggest that even when little context is provided, typical adults benefit from augmentative signs when learning new words for new concepts. The fact that TD children did not show this same beneficial effect of augmentative signs suggests that vocabulary learning with augmentative signs may be a different mental process for children than for adults. The development of executive functions may (also) play a role in this distinction.

Keywords: multimodality, augmentative signs, word learning, degraded speech



# Gestures conveying possible upcoming problematic issues

Nynke Van Schepen

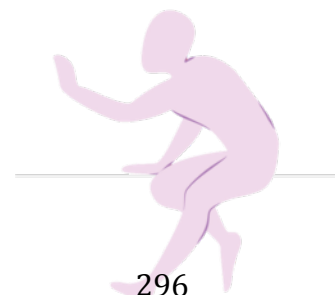
University of Basel – Maiengasse 51 4056 Basel, Switzerland

This paper deals with gestures made after a lexically and syntactically unfinished turn. By gesturing in this position, participants display an orientation towards a possible problematic issue without mentioning it verbally. Previous conversation analytic research showed that the projection and accomplishment of units in action are locally unfolding in an emergent way and can be manifested through the deployment of different resources and practices, and are specially organized with regard to their recipient. Lerner (1991) showed that through the practice of collaborative completion, a recipient of an unfinished turn of the type ‘if X (than Y)’ manages to grasp the turn’s projected action and thereby co-constructs it. Chevalier & Clift (2008) showed that recipients of an unfinished turn, still manage to grasp the action initiated by the speaker of the initial action and respond to it accordingly. More recently, the study of embodied turn-completions (see for example Olsher 2004, Mori & Hayashi 2006, Keevallik 2013 and Mondada 2015) showed that verbally unfinished turns can be in fact treated as multimodally complete.

The paper is based on video recorded data documenting a participatory democracy project, in which citizens are invited to contribute to public issues by participating in large public meetings. In this setting, citizens, after having heard talks by experts and politicians on different subjects, are invited to ask questions or comment on what they just heard. This paper focuses on gestures done at the end of an unfinished turn by citizens – within what Schegloff (1984) termed the projection space. The analysis shows that by so doing, the citizen displays an orientation towards the issue at hand as being possibly problematic. Since no syntactical completion is provided and the unfinished turn projects numerous possibilities for completion, the citizens manifest their personal orientation in an allusive way, without mentioning it. This gesture can be followed by definitive absence of talk, a restart in attempt to close the action or a formulation of the projected action that was delayed by the gesture – all convey an orientation to bringing the action to a close (see Sacks & Schegloff 1973 on ‘bringing the interaction to a close’). This study aims at studying different sequential environments in which these citizens use gesture as conveying an upcoming problematic issue.

The paper therefore aims to contribute to our understanding of the numerous ways in which actions can be accomplished and conveyed and the central role of gesture when handling a possible delicate issue. Moreover, it shows the careful attention of citizens to not overtly criticize politicians, thereby displaying an orientation to the institutional task, which is to ask questions rather than express critical opinions.

Keywords: Conversation Analysis, Interactional Linguistics, Unfinished turns, Multimodality, Political talk



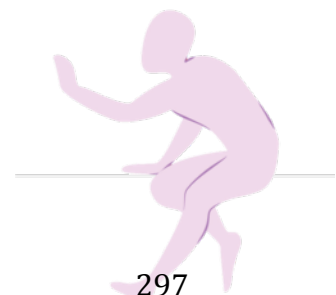
# Semantic integration of speech and iconic gestures: bringing the face into the picture

David Vinson, Pamela Perniss, Gabriella Vigliocco

University College London (UCL) – University College London, 26 Bedford Way, London WC1H 0AP, United Kingdom

Comprehenders cannot avoid processing iconic gestures: behavioural studies show that there is a cost for processing incongruent gestures even when they are explicitly task-irrelevant. Neurally, various studies attribute semantic integration of speech and iconic gesture to some combination of bilateral temporal regions (middle temporal gyrus, posterior superior temporal sulcus) and left inferior frontal gyrus. Incongruent speech-gesture combinations have been used as essential evidence for integration, especially increased activation for incongruent > congruent comparisons in left IFG but also in pSTS. To date nearly all studies using incongruent speech- gesture combinations used headless videos, masking or digitally altering the speaker's face to avoid incongruence between lip movements and speech. However, a speaker's face is usually visible when comprehenders can see gestures, and eliminating visual cues to speech may create additional processing demands, especially related to multisensory integration, that would not be present if the face were visible and consistent with heard speech. In the present fMRI study, we created incongruent speech-gesture combinations (verb+iconic gesture, e.g. "sawing" with the gesture TWISTING) by digitally altering congruent videos in a manner that did not obscure the face; the speaker's face was always congruent with the speech signal. We also created speech-only (still body) and gesture-only (silent, still face) videos from the same sources. As visual information always accompanied speech, this allowed us to distinguish semantic integration from multisensory integration. 18 native English speakers viewed the videos (40 per condition) and attended to their meanings whilst monitoring for a dot probe (filler trials). We carried out group independent components analysis (blind to experimental conditions) and then tested the extent to which the identified networks differed by condition using GIFT <http://mialab.mrn.org/software/gift/index.html> Components reliably associated with all conditions included low-level visual processing areas as well as somewhat right lateralised activity in inferior and middle frontal regions. Four components were more active for conditions including gestures (vs speech-only), including bilateral MTG, visual processing regions and postcentral gyrus); while two components were more active when speech was present (vs gesture-only), particularly bilateral superior temporal gyrus. No components were more active for combined (speech+gesture) over single (speech-only, gesture only) stimuli. However, one component was more active for incongruent than congruent stimuli: left-lateralised network comprising middle and posterior temporal regions, left inferior parietal lobule, left inferior frontal gyrus and precentral gyrus. Overall, we found no evidence for increased involvement specifically in temporal regions particular to integrating gestures with speech that is both seen and heard; instead we found evidence for semantic integration not only in left IFG but a more widespread left-lateralised network. These findings highlight the importance of incorporating the visual aspects of speech into studies concerned with speech and gesture, particularly in teasing apart multisensory and semantic integration.

Keywords: fMRI, semantic, brain, integration, iconic gestures, incongruence



# Observing iconic gesture promotes semantic learning in children with specific language impairment

Susanne Vogt<sup>1</sup>, Christina Kauschke<sup>2</sup>

<sup>1</sup>University of Applied Sciences Fresenius – Limburger Str. 2 65510 Idstein, Germany <sup>2</sup>Philipps-Universität Marburg – Institut für Germanistische Sprachwissenschaft Philipps-Universität Marburg Wilhelm-Röpke-Straße 6A 35032 Marburg, Germany

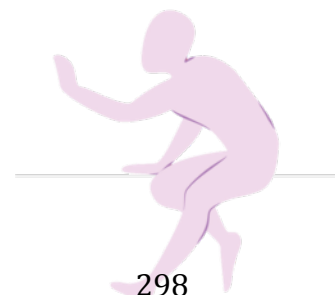
Iconic gestures capture properties of a referent. They have been shown to improve word learning in typically developing children (TD; e.g. Capone & McGregor, 2005; McGregor, Rohlfing, Bean, & Marschner, 2009) and children with specific language impairment (SLI; Ellis Weismer & Hesketh, 1993; L'uke & Ritterfeld, 2014). It is argued that observing iconic gestures enriches semantic representations and thus strengthens the link to the word form. Achievement in word learning has mostly been assessed through naming and comprehension tasks, which give a general picture of a child's vocabulary skill (Paul & Norbury, 2012). This study extended previous work in order to particularly tap semantic learning in both children with and without SLI. To this end, children's definitions of taught words were examined. Specifically, we investigated the effect of iconic gestures on word definitions.

A training study (3 sessions) was conducted teaching new words to 20 children with SLI (age 4), 20 age-matched (AM) TD and 20 language-matched (LM) TD children (within-subjects design). Half of the words were presented with iconic gestures illustrating a property of the referent (iconic condition), the other half were presented with a semantically meaningless gesture (control condition). Richness of semantic representations of target words was assessed through a word definition task after training completion. Definitions were scored for semantic content. This served as a measure of meaning representations. Performance was analyzed between learning conditions.

AM children gave word definitions with more content information than LM children. Definition abilities of children with SLI did not differ from either TD group.

An rmANOVA revealed no main effect of learning condition on definition performance. However, there was a significant interaction condition × group such that in particular children with SLI, but not TD children, benefited from observing iconic gestures. Thus, children with SLI exploited the characteristic capacity of iconic gestures to capture properties of a referent for learning and thereby established a deeper semantic understanding of the word. This paper will discuss the role of iconic gesture in semantic learning in both children with SLI and TD children.

Keywords: iconic gesture, children, specific language impairment, semantic representation



## "Action verbs" in Italian Sign Language (LIS): "General verbs" versus verbs with object and/or modality of execution incorporated

Elena Tomasuolo, Alessandro Panunzi, Daria Appetiti, Cristiana Sanalidro, Virginia Volterra

Istitute of Cognitive Sciences and Technologies - CNR (ISTC) – Italy

Most high frequency verbs referring to Action in everyday communication are "general": they productively extend to different actions in their own meaning. Languages categorize actions differently and mistranslations are common. The projects IMAGACT and MODELACT, have identified and represented 1010 distinct action concepts with prototypical filmed scenes. This linguistic infrastructure is used to investigate action verbs in LIS. Sign languages give the possibility to represent an action incorporating some of the verb arguments and/or modality of execution in a mimetic way: different action types, labelled in English or Italian by a general verb such as "to turn", are represented by different specific signs.

Goal of the present study is to investigate systematically how deaf signing children use general and/or specific verbs to represent different actions. Participants are 24 deaf signing children (5-10 years): 13 exposed early to LIS (first year of age) and 11 exposed later (after 36 months of age). To investigate LIS productions five "general" action verbs have been selected *Prendere*, *Aprire*, *Girare*, *Rompere* e *Attaccare*.

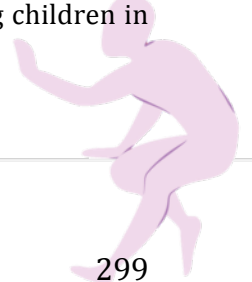
For each of these verbs 9 different videos, referring to specific actions, have been shown to deaf signing children asking to describe the action performed. All LIS productions (total 882) have been recorded[1]. By now, LIS productions (total 192) referring only to two general verbs and only 4 videos for each verb have been analysed: set A - *PRENDERE* (to take) and set B - *GIRARE* (to turn). Specific actions described in Italian by the same verb (<http://www.youtube.com/playlist?list=PL6YW5ln2Xn8w9dD7FC>)

A pilot study conducted with LIS adult signers has shown that specific signs incorporating objects are preferred for each of these contexts.

Results show that the majority of productions, 57,3%, are signs incorporating the object and/or the modality of execution, only 18,7% are "general verbs", 9,9% include both, the "general verb" + the verb incorporating objects, 8,9% are semantically related verbs and 5,2% extra target signs. Interesting differences are observed between the productions elicited by the two sets: for both the majority of productions are signs incorporating objects but for set A the percentage is 41,7% versus 31,3%, while for set B is 73% versus 6,2%. Furthermore there is a clear effect of age of LIS exposure: children exposed early produce more specific verbs in respect to children exposed late: 60,6% versus 53%. The opposite tendency is shown in the case of general verbs: 11,5% versus 27,3%.

Results show that despite a strong tendency of LIS to be very specific in its verbal lexicon, other variables such as type of action and age of acquisition influence children productions. The same materials have been used to collect comparable data (not presented here) with hearing children in spoken Italian.

Keywords: Action verbs, Italian Sign Language, deaf signing children





# Dual feedback in triadic interactions: on the interplay between gesture and gaze

Jelena Vranjes, Annelies Jehoul, Kurt Feyaerts, Geert Brône

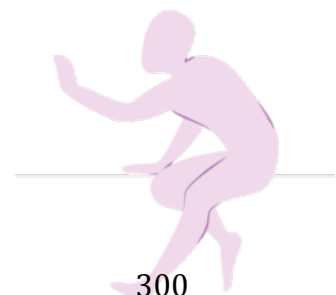
KULeuven – Belgium

In face-to-face interactions there is typically a high degree of reciprocity between speakers and listeners (Bavelas et al. 2002). During ongoing utterances, listeners manifest their attention and understanding in a multimodal way: by orienting their gaze towards the current speaker, nodding or shaking their head and uttering brief vocalizations such as ‘mm hm’ or ‘yeah’. These so-called backchannels (Yngve 1970) or listener responses (Bavelas et al. 2002; Dittmann and Llewellyn 1968) are used in a “cooperative” way of exchanging information about the successfulness of communication (Allwood & Cerrato 2003). Some studies have focused on the multimodal character of listener responses in two-person conversations (Bavelas 2002, Allwood & Cerrato 2003, Bertrand et al. 2007). However, there is very little research on multimodal feedback patterns in multiparty interactions, which by definition create more complex grounding situations for both speakers and hearers. In the present study we focus on the role of eye-gaze in multimodal displays of reciprocity in monolingual and bilingual triadic face-to-face interactions. More specifically, this paper provides a detailed analysis of dual feedback patterns. By dual feedback we mean listener responses (for example head nods) that are directed to both interlocutors and by which the listener claims access to and understanding of the conveyed stance without taking the conversational floor (authors 2015). The present study builds on existing research on the role of listeners’ head nods in social interaction (Stivers 2008). We focus our attention on listeners’ nods that are accompanied by a specific gaze behavior (gaze shifts) in order to investigate how these two modalities interact in the establishment of dual feedback. Moreover, the study provides a detailed account of the sequential organization of listeners’ dual feedback by taking into account the current speaker’s verbal and gestural behavior.

We analyzed dual feedback patterns in two types of triadic face-to-face interactions; informal everyday monolingual conversations (InSight Interaction Corpus, Brône & Oben 2015) and a set of authentic interpreter-mediated dialogues. Interpreted interactions are particularly interesting for the study of listener response strategies because the communicative contact and rapport between the primary speaker and recipient is established through a mediating third party. Both the monolingual and interpreted recordings were made using mobile eye-tracking glasses (Gullberg & Kita 2009, Jokinen 2010, Brône & Oben 2015). In this way, we were able to capture detailed gaze information from all interlocutors together with the co-occurring gestures.

Our study contributes to the existing multimodal accounts of listener responses in multiparty interactions. Also, by comparing different types of triadic settings, the study sheds some light on the context-sensitive aspects of gestural/dual feedback patterns.

Keywords: multimodality, gestural backchannels, eye gaze, eye tracking



# Mismatches between word and gesture – a Sign of change

Orit Sonia Waisman

David Yellin College – 7 Hamaagal St. PoBox 3578, Israel

This paper will focus on cases of gesture-word mismatches that were identified during conflict situations and were analyzed semiotically (Waisman, 2010). Emphasis will be put on possibilities of future interdisciplinary research. The main data is comprised of a series of video-recorded sessions between Israeli-Arab and Israeli-Jewish students. The mismatches were analyzed through the theory of Phonology as Human Behavior (PHB) of the Columbia School (CS) sign-based theory of linguistics (e.g. Davis 2006, Tobin 1990, Tobin & Schmidt 2008) and the theory of Word Systems (e.g. Apeh & Tobin, 1988). These approaches were originally designed for the study of linguistic signs. Analyzing text with its verbal and nonverbal signs combined proved fruitful as hidden veiled messages were revealed.

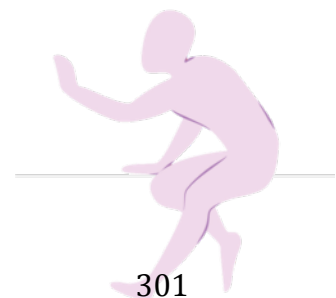
Using a large corpus of natural spoken and audiovisual-recorded data, findings revealed that mismatches point to a situation in which the speaker's high emotional state leads to a search of a different means of expression. This conclusion is consistent with Goldin-Meadow's claim that mismatches serve as a signaling of a transitional state and it actually helps the learner formulate new ideas (Church & Goldin-Meadow, 1986; Goldin-Meadow et. al. (1993) and Goldin-Meadow (2003). Mismatches were also found to help heighten learning processes (Kelly et al. 2010). Fascinatingly, one of McNeill's mismatch experiments revealed that listeners were prepared to go to a "quite radical length" to avoid conflict between the modalities, to come up with a message that avoided the contradiction caused by the mismatch between them. (McNeill 1992:143).

Intriguingly, recent studies of dyadic interactions show how mismatching states between parent and child enhances the child's development and are part of the normal developmental process. (Breeglhy & Tronick, 2011; Beebe & Lachmann, 1998, see also Waisman, 2014).

The mismatch phenomena mark a point of significance in the text and act as a guide, revealing significant events or emotionally noteworthy interactions. The author is both a linguist and a dance-movement therapist, which gives her a holistic perspective on the linguistic text that includes the adaptation of various movement analyses that are used in the field of dance movement therapy. Therefore, this study contributes to our understanding of linguistic-linguistic mismatches in situations of conflict and may pave the way for similar research in sociology, socio-linguistics, psycholinguistics, and political science. (see also Cuffary, 2011).

The role of the mismatches in the text can be regarded as a crack in the glass, or a slit in the fabric that engulfs the speech production process. Mismatches between verbal and non- verbal modalities provide a rich and promising area of research for diverse fields.

Keywords: verbal mismatches, conflict, semiotics



# Initiation-Response-Feedback sequences in the English as a foreign language classroom: Trainee teachers' embodied actions in co-teaching practice sessions

Katherina Walper G.<sup>1,2</sup>

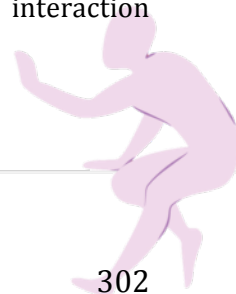
<sup>1</sup> Centre for Advanced Studies in Language and Communication, The University of York (CASLC, UoY) – United Kingdom <sup>2</sup> Instituto de Lingüística y Literatura, Universidad Austral de Chile (UACH) – Chile

This presentation will follow a multimodal Conversation Analytical approach (Schegloff 2007) to explore single cases of the ways trainees embody the IRF sequence in instances of co-teaching at an English as a Foreign Language teacher training programme in the South of Chile. In terms of sequences, the Initiation-Response-Feedback (IRF) (Sinclair & Coulthard 1975) has been identified as the most characteristic pattern of classroom interaction. Regarding initiations, referential questions lead students to produce longer turns with more syntactically complex utterances (Brock 1986), while display questions accomplish more communicative and pedagogic actions other than 'only' requesting information known by the teacher (Lee 2006). In embodied terms, it is relevant to identify how trainees, for example, cue and mobilise responses through gestures and gaze patterns (Stivers & Rossano 2010). In the same manner, students gesture to deal with instances of: lexical compensation, speech accompaniment, mutual elaboration of turn completions and compensation or self-regulation, among others (McCafferty & Stam 2008). Third, the feedback turn provides linguistic and interactional evidence through the possibilities it entails: repair sequences, or implicit/ explicit corrections are called in action and participants must make full use of their gestural repertoire (Gullberg 2006) in order to successfully orient to the polyfocal dimension of class interaction (Brahim 2015).

Results show that trainees use gaze and hand gestures to mobilise responses, but fail to produce extended pauses to allow students to take the next turn (Walsh 2013). Since these training sessions are carried out in pairs (co-teaching), gaze becomes a significant resource trainees use for coordination. At the same time, turn design and gaze make it evident that at certain moments one trainee holds the epistemic status over the other (Heritage 2013). Gestures and gaze also play a leading role in orienting to parallel actions; for example, to deal with the wrong answer trainees make use of delegated repair (Kasper 1985) where another peer provides the correct answer: the first student is able to recognise her mistake and, thus, seeks mutual gaze alignment with the teachers (Rossano 2012) to account for her mistake, which is accomplished through gesticulation (McNeill 2006). In Sum, data also shows that trainees do not make full use of the third turn to provide feedback; they orient at moving the action forward to complete their lesson plan – possibly because they are being observed by the professor in charge of the module, and they are expected to complete their activities within the allotted time.

Finally, this study becomes relevant in the quest of exploring and outlining trainees' verbal and embodied classroom interactional competencies (Walsh 2013; Gardner 2013), and – thus – uncover their knowledge regarding semiotic systems and the use of paralinguistic features in interaction (Seedhouse-Markee 2015).

Keywords: Initiation, response, feedback, gaze, hand gestures, teaching, teacher training, Chile



# Can co-speech gesture change the perception of ambiguous motion events? Experimental evidence from Italian

Bjørn Wessel-Tolvig<sup>1</sup>, Patrizia Paggio<sup>1,2</sup>

<sup>1</sup>Centre for Language Technology, University of Copenhagen – Denmark <sup>2</sup>University of Malta – Malta

How sensitive are we to information provided by co-speech gestures when interpreting ambiguous motion constructions? We present an experimental judgment task in which we investigate the effect of gesture information on different types of ambiguous motion constructions in Italian.

One of the major limitations for verb-framed languages is the boundary-crossing constraint [1, 2], which predicts that movement across a spatial boundary cannot be lexicalized with a manner verb and a preposition, e.g. as done in the English ‘roll into’. In these languages, boundary-crossing motion must be expressed in a different way, e.g. a path verb like ‘enters’ since the prepositional system is inherently locative, and prepositions therefore do not encode the directionality needed to express translational motion across a boundary [3].

Romance languages, and among them Italian, are generally described as verb-framed languages [4, 5]. However, recent theoretical debate suggests that speakers of Italian may disregard this constraint and express boundary-crossing motion events with certain types of manner verb and complex PP combinations [6, 7]. An expression like ‘Il pallone rotola fuori dalla stanza’ can thus be read as ‘the ball rolls out of/outside the room’. The reading often depends on contextual inference or pragmatic clues [8].

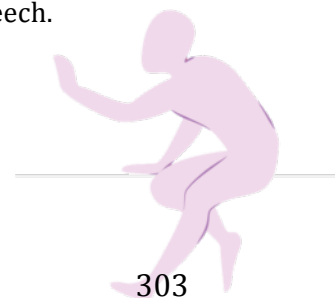
Before testing the effect of co-speech gestures on the interpretation of ambiguous motion event expressions, a questionnaire (109 Italian participants) was conducted to verify the interpretation of manner verb + PP constructions involving different types of verbs (ambiguous manner verbs and pure manner verbs). These results confirm the existence of a boundary-crossing interpretation for certain types of Italian manner verb + PP constructions.

Based on these results, we created video materials in which an Italian speaker expressed the same motion events as in the first task, but this time with different co-speech gestures. Half the verb + PP constructions in each group were accompanied by directional (path) gestures, and the other with locative (manner) gestures. 103 participants were asked to judge the expressions whether they denoted boundary or non-boundary-crossing movement.

The results show that co-speech gesture can change the perception of the events. A locative manner gesture can change the default interpretation of verb + PP constructions that allow boundary-crossing readings to be interpreted as purely locative, and directional path gestures can change the interpretation of verb + PP constructions that do not allow boundary-crossing interpretation to be perceived as boundary-crossing.

To summarize, the study confirms the existence of boundary-crossing interpretations for certain types of Italian manner verb + PP constructions, but more importantly that co-speech gestures can change the perception of events and ‘override’ default meaning expressed only in speech.

Keywords: Judgment task, co, speech gesture, perception, motion events



# Perceived conventionality in co-speech gestures recruits the neural network for language processing

Dhana Wolf <sup>1,2</sup>, Linn-Marlen Rekittke <sup>2</sup>, Irene Mittelberg <sup>2</sup>, Klaus Mathiak <sup>1,3</sup>

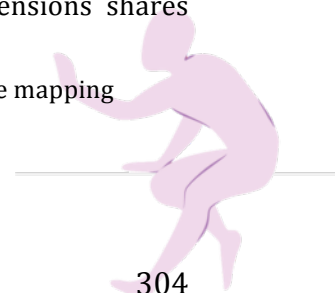
<sup>1</sup> Department of Psychiatry, Psychotherapy, and Psychosomatics, Medical School, RWTH Aachen University – Germany <sup>2</sup> Natural Media Lab, Human Technology Centre, RWTH Aachen University – Germany <sup>3</sup> JARA-Translational Brain Medicine, Aachen / Jülich – Germany

Besides modulating and emphasizing certain aspects of the associated speech content, co-speech gestures may encode specific meanings. Increased degrees of conventionality and habit (Peirce, 1960[1]) may not only reside in emblems, but also in gestures exhibiting pragmatic functions and/or reflecting formal, semantic, and conceptual patterns (e.g., image schemata, action routines [2-5] which enhance the extraction of meaning and function. Applying Peirce's Universal Categories [1] to gesture, we suggest that during gesture perception Thirdness encompasses such different dimensions of conventionality in gestures, whereas Firstness pertains to the potentiality of meaning and Secondness to local contextualized meaning. Spoken, signed and written language consist of predominantly conventional, highly symbolic signs and thus tend to be understood primarily in Thirdness. Taking a neuro-semiotic approach, we aimed to test the hypothesis that neural processing of diverse conventional dimensions in gestures relies on language processing networks, namely Broca's and Wernicke's areas. Twenty-four videos of 12 German native speakers (6 females) retelling short movies were paired to create audio-visual stimuli of 9.5 min duration. 36 subjects were given three tasks while watching 12 videos: firstly, they pressed a button whenever they saw gestures that matched the given task; secondly, they watched 12 videos during fMRI. The tasks were to detect a) conventional gestures ('allgemein gebräuchliche Handbewegung') and, as control tasks, b) hand movement ('Bewegung der Hände'), and c) gestures relating to spoken content ('Verbindung zum Gesprochenen'). The order of tasks, videos and the individual task-video combinations were randomized and balanced across subjects. Since the design is naturalistic, perceived gesture functions were expected to vary; therefore, covariances across the time series were analyzed across the group with respect to task effects.

In the behavioral experiment, covariances of button-press frequency were higher for the same task compared to between tasks ( $p < .001$ ), showing inter-subject reliability between tasks. The inter-subject covariance (ISC) analysis of the fMRI data revealed a significant influence of the task on synchronous neural activity ( $pFWE < .05$ ) in Broca's area only. In this cluster, higher ISC emerged during the detection task of conventional gestures compared to both other tasks and to ISC during different tasks. No such effect was observed in Wernicke's area, even after lowering the threshold to an exploratory  $T=2.73$ .

Giving simple instructions to lay subjects may induce enhanced processing of the conventional dimensions of gestures, as revealed by higher inter-subject synchronization of neural responses in the language network. However, in the language processing network, only Broca's activity was task-specific. Semantic encoding in Broca's area has been reported as modality-independent [6-8]; here, attending to conventionality enhanced its involvement. Thus, like emblems and sign language [9], neuronal processing of gestures that exhibit various kinds of conventional dimensions shares features with the processing of linguistic items.

Keywords: conventionality, co-speech gesture, neurosemiotics, fMRI, inter-subject covariance mapping



# Creativity of spoken narratives manifested in gestures in school-aged children

Kit-Yi Miranda Wong, Long-Ying Sandy Yim, Hoi-Yee Kelly Kam, Hei-Man Karen Kam

The Chinese University of Hong Kong – Hong Kong SAR China

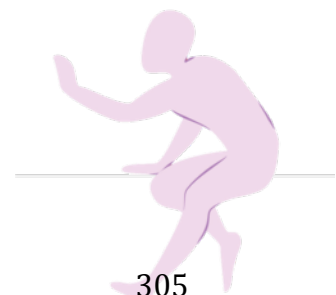
Children gesture when telling stories (Scheub, 1977; McNeill, 1992), e.g., a child says, "The cat is climbing up the tower [RIGHT HAND MOVES UP]." Gesture conveys substantive information to listeners (Goldin-Meadow, 2003). Thus, the present study examined whether producing more gestures would make a story more creative. Specifically, we asked whether a child who gestured more often than others in his/her narrative was rated to be more creative than others. In Study1, we developed a scale evaluating children's creativity in narratives. In Study2, we examined gestures produced by children in narratives and asked raters to assess the children's creativity based on the established scale. In Study 1, thirty Chinese(Cantonese)-speaking children (17females; aged $6\pm1.11$ ) with normal IQs ranging from 75-127 (mean $102.70\pm11.61$ ) took Guilford's Alternate Uses Task (1967), which assessed their creativity-relevant skills, followed by a spoken narrative task in which they told a story about a cat. Thirty Chinese(Cantonese)-speaking undergraduates watched the video- taped narratives and were interviewed on children's creativity of spoken narratives. A 21-item scale measuring creativity of spoken narratives(CSN) was then derived based on their responses and creativity literature. A different group of five Chinese(Cantonese)-speaking undergraduate raters watched the videos and rated children's creativity on the scale. The scale demonstrated sound psychometric properties, with Cronbach's alpha of .97 for the internal consistency, and intraclass correlation coefficient of .91( $p < .001$ ) for the interrater reliability. Principal Component Analysis with promax rotation extracted 3 factors (accounted for 75.20% of the variance): novelty, expressiveness, and reasonability. The total score of the scale and its 3 factors was positively correlated with three out of four AUT subcategories ( $r = .38-.61$ ,  $p < .05$ ), suggesting that the scale had good convergent validity.

Having established the CSN scale, we further examined children's gesture use and its relation to their creativity in Study 2. A different group of twenty-eight Cantonese-speaking children (8females; aged $9.02\pm1.50$ ) told the same story as in Study 1. Then five raters rated each of their creativity using the CSN scale.

Children's overall creativity of spoken narratives was correlated with gesture frequency ( $r = .43$ ,  $p < .011$ ). Children who were perceived to be more creative in spoken narratives produced more deictic ( $r = .45$ ,  $p < .016$ ) and iconic ( $r = .41$ ,  $p < .032$ ) gestures. These children also produced more gestures that reinforced the meaning of co-occurring speech ( $r = .43$ ,  $p < .022$ ) and gestures that disambiguated accompanying speech ( $r = .44$ ,  $p < .018$ ). Similar patterns were found in two of the factors: novelty and expressiveness but not in reasonability.

To summarize, children who are perceived to be more creative tend to use more deictic and iconic gestures to reinforce or disambiguate accompanying speech. By doing so, they can strengthen or clarify the creative ideas conveyed in speech.

Keywords: Gesture, Creativity, Spoken Narratives, Children





# Gesture difference in transitive/inchoative alternation

Suwei Wu

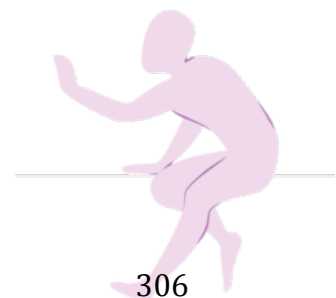
Vrije Universiteit Amsterdam [Amsterdam] – De Boelelaan 1105 1081 HV Amsterdam, Netherlands

Various studies have found that gesture seems to correlate with various aspects of grammar, such as aspect (Duncan 2002, McNeill 2003), punctuality (Becker, Cienki et al. 2011), and transitivity (Parrill 2010, Wu and Cienki 2013). In terms of gestural modes of representation (Müller 1998, 2014), previous research shows that transitive clauses are more likely to be accompanied by gestures with an Acting mode - miming an activity of manipulating an object, while intransitive clauses are more likely to be accompanied by gestures with a Tracing mode - tracing a trajectory of a movement (Wu and Cienki 2013). However, in the aforementioned study, prototypical transitive events co-occurring with gestures were mainly placement or handling events (e.g. clauses with put) while prototypical intransitive events were mainly motion events (e.g. clauses with go, dance). Thus it remains unclear whether the above gesture difference is caused by transitivity or just by the types of verbs. Against this background, this study explores how transitivity relates to gesture from the perspective of transitivity alternation - specifically transitive/inchoative alternation in this case, which involves the same verb but different grammatical structures, such as *She opened the door* & *The door opened*. In a word, it aims to see whether people gesture differently when they use different grammatical structures for the same verb, in terms of the gesture forms and the Modes of Representation involved. Four types of transitive-inchoative pairs classified by Levin (1993) are employed in this study: BREAK verbs such as break and smash; BEND verbs such as bend and fold; ROLL verbs such as twist and move; and OTHERS such as open and close. A large multimodal American English corpus - the Red Hen Corpus (<https://sites.google.com/site/distributedlittleredhen/home>) - was used to extract the examples for each pair co-occurring with gestures. All representational gestures are coded for form parameters (Handedness, Hand shape, Orientation, Movement type and Movement quality) and modes of representation (Acting, Tracing, Molding, Embodying).

A preliminary study on the open/close pair shows that transitive clauses of this pair such as *She opened/closed the door*, are more likely to be accompanied by gestures with Fist handshape and Acting mode (around 72%), while intransitive clauses such as *The door opened/closed*, are more likely to be accompanied by gestures with Flat handshape and Tracing mode (around 78%). In other words, different grammatical structures of a same verb seem to be accompanied by different gestures.

Furthermore, according to Langacker (1991, 2008), a speaker is profiling different parts of an event by using different grammatical structures of a same verb. This study suggests that this profiling difference can be reflected in co-speech gesture as well, which provides a further implication, namely how conceptualization in grammar relates to gesture production.

Keywords: Transitive and inchoative alternation, Profiling, Co, speech gesture



# Origins of human communication: A longitudinal study of development of gestural communication system.

Jiahao Eric Yang, Phoebe Ng, Anthony Chui, Sarah Ku

The Chinese University of Hong Kong – Hong Kong SAR China

How does a human communication system develop? Some researchers claimed that human interaction is characterized by gestures but later dominated by spoken modality (Corballis, 2003; Arib, 2005). This theory has found empirical support in studies investigating emergence of sign languages or home sign system in isolated populations (e.g., Kegl, et al., 1999; Goldin-Meadow & Mylander, 1998) and in experiments examining the universal structure of communication system by asking participants from different cultural backgrounds to communicate only through gesture (e.g., Gershkoff-Stowe & Goldin-Meadow, 2002; Goldin-Meadow et al., 2008; Langus & Nespors, 2010; Fay et al., 2013). For example, Goldin-Meadow et al. (2008) found that adult speakers of four languages, which have different predominant word orders, combined gestures to form sentences in nonverbal tasks and their sentence structure was actor-patient-act.

The present study took a step further by looking at the characteristics of gestural communication system when it was given time to evolve. Four speakers (Chinese, Korean, English, and Spanish) were invited to use gestures only to discuss certain topics with others in twenty 30-min sessions, with two sessions per week, for two months. These four languages differ in syntax and morphology, which allowed us to investigate how different language structures would exert influence on participants' nonverbal representation. .

Totally 733 gestures was recorded in the first three sessions. We focused on the changes of gesture sentence complexity, development of sentence structures, and adoption of markers (gestures that carry cultural-specific meanings) by other speakers across three sessions. Results showed that gesture sentences became more syntactically complex, with the mean number of gestures per sentence increased from 3.69 in the 1st session to 4.46 in the 3rd session. In respect of the sentence structure, we classified all sentences into two categories (action-first or action- last) based on the positions of action in the sentences. Nearly all speakers placed action at the end of the sentences in the 1st session (Goldin-Meadow, et al., 2008). However, they started moving action to the first position in the 2nd and 3rd sessions. Participants were also found to adopt markers used by others. For example, the Chinese participant adopted a Mexican marker (index finger and middle finger holding up and nodding at the chest level, which means approval) since the 2nd sessions; the Mexican participant adopted a Korean marker (index finger drawing two circles at one side of the body, which means being past) since the 1st session after she saw this gesture from the Korean speaker. Taken together, the features of gestural communication changes over time. The present longitudinal study can provide us with more insights to understand how a natural communication system develop in the communities involving different linguistic and cultural backgrounds.

Keywords: Origins of human communication, gesture, cross, linguistic, syntax, semantics



# The Semantics of Beat Gestures

De Fu Yap, Daniel Casasanto

University of Chicago – Psychology Department, University of Chicago 5848 S. University Avenue, Chicago, IL 60637, United States

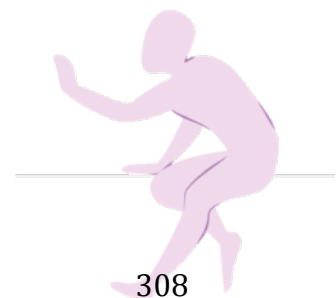
Leading theories of gesture agree that beat gestures are meaningless [1]. According to a typical definition, beat gestures are “movements that emphasize the prosody or structure of speech without conveying semantic information” [2]. Here we challenge this widely held belief on the basis of a large-scale analysis of more than 3000 spontaneous co-speech gestures. Across three experiments, 80 English speakers were videotaped while they studied six brief stories (50-100 words), one at a time, and then retold the stories from a first-person perspective to another participant, seated in front of them. Participants did not know their gestures were of interest. They retold three types of stories, each of which contained either literal spatial language (LSL; the rocket went higher), metaphorical spatial language (MSL; the temperature went higher), or non-spatial language (NSL; the temperature got hotter). LSL stories described physical objects and events directed either upward, downward, right, or left. MSL stories described non-spatial ideas that are commonly described using spatial metaphors implying both orientation and direction along the vertical, horizontal, or sagittal axes [3]. NSL stories were identical to the MSL stories, except that all metaphorical spatial words were replaced with non-spatial equivalents.

Speech and gesture were coded separately, by independent coders, following [4]. Coder 1 transcribed the speech, parsed it into clauses, and coded each clause for its literal or metaphorical spatial directionality, blind to any accompanying gestures. Coder 2 parsed gestures into phrases [1], “deaf” to the accompanying speech, and coded the dominant direction of each stroke (e.g., up, down, left, right, ahead, back). Coder 2 then determined whether each gesture was a beat or another type of gesture, according to McNeill’s [1] beat filter. Finally, the directions of beat gestures were coded as Congruent or Incongruent with the spatial direction implied by the speech.

Speakers produced a total of 3439 gestures during clauses with literal or metaphorical spatial content. Most of these gestures, 75% ( $n=2586$ ), were beat gestures. Of primary interest, for beat gestures that occurred on the relevant axis for a given story (vertical, lateral, sagittal), the majority of gestures were congruent with the directions implied by the spoken clauses they accompanied (76% congruent,  $p < .00001$ ). This was true regardless of whether space was used literally (80% congruent,  $p=.0004$ ) or metaphorically (75% congruent,  $p < .00001$ ), and whether abstract concepts were described with or without spatial language (MSL: 71% congruent,  $p=.0004$ ; NSL: 77% congruent,  $p < .00001$ ).

This large, blind, hypothesis-driven, quantitative analysis reveals literal and metaphorical spatial semantics hidden in the directions of beat gestures’ strokes. These results corroborate the results of a descriptive analysis reported by Casasanto [5], suggesting that beats are both pervasive and meaningful, and motivating a reconsideration of beats in theories of gesture.

Keywords: metaphor, iconicity, beat gesture



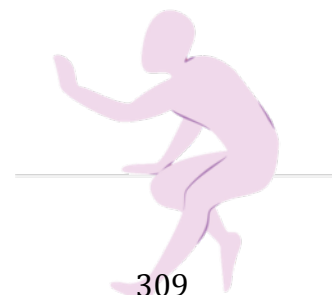
# Using the hands to learn about the brain: Testing gesture-based instruction on brain anatomy

Shira Yellin, Fey Parrill

Case Western Reserve University (CWRU) – United States

Teaching basic brain anatomy can be challenging because easily available visualizations (images in textbooks) are two dimensional, while the brain is three-dimensional. This study tests a method of instruction during which participants are trained to use their own hands to represent the brain and to perform gestures with their hands. We compare this instruction to other types of training. Previous research has shown that adding gesture to learning can improve recall (e.g. Macedonia & von Kriegstein, 2012). Participants take a pretest measuring their anatomical knowledge, then receive a video training in one of four conditions (see Figure 1 for clarification): 1. Image (I): Hear audio describing parts of the brain, directed to look at static images of brain, repeat elements of the audio. 2. Model condition (M): hear same audio as I, directed to look at hand pointing to parts of a model of brain, repeat elements of the audio. 3. Hand Model (HM): hear almost identical audio as in previous conditions, directed to look at static images of hands used to represent brain, repeat elements of the audio. 4. Hand Model plus Action (HMA): hear almost identical audio as in previous conditions, directed to look at video of hands used to represent brain, repeat elements of the audio and imitate gestures seen in video with own hands. Participants then take a posttest measuring their learning both on factual information and on transfer problems (applying learning to new concepts). After four weeks, participants take a followup post-test measuring delayed recall. This study is in the data collection phase. We predict that participants in the HMA condition will perform better on the posttest and have better delayed recall during followup than participants in other conditions because the self-performed gestures will lead to better encoding.

Keywords: Gesture, brain anatomy, teaching and learning



# The performative 'ring': semi-conventionalized gesture as a resource for constructing social stance and identity

Keli Yerian

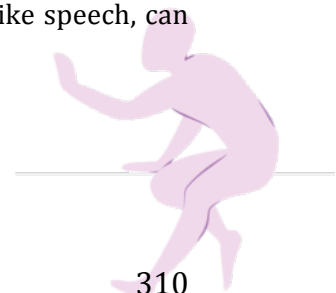
Université d'Oregon (UO) – University of Oregon Eugene, OR 97403-1302, United States

As focus on the multi-functionality of gesture grows (e.g. Kok, Bergmann, Cienki & Kopp 2016), one promising area of inquiry includes how gesture offers multiple potentials for not only referential and discourse meanings and functions, but also, simultaneously, performative social meanings as related to the construction of stance and identity (e.g. Brookes 2011). Semi-conventionalized gestures, which have recognizable forms yet are typically spontaneously produced, may have particularly rich potential for carrying and creating such social meanings. The 'ring' or 'precision-grip' (index and thumb held together) is one such example, with its historical presence in Italian oratory (Quintilian, as cited in Kendon 2005), its attested continued use in several European languages (e.g. Kendon 2005, Calbris 2011, Neumann 2004), and its apparent "reflexive reanalysis" in political debate (Lempert 2011, p. 247).

This paper first presents a broad quantitative description of the appearance of the precision grip gesture in video-recorded data from over 150 English academic presentations in US university settings. These include more than 20 native or near-native English speaking academic faculty, more than 20 first year native or near-native graduate students, more than 70 intermediate-advanced level non-native English-speaking graduate and post-graduate students (representing 20 nationalities), and more than 40 native English-speaking undergraduate presenters. Instances of uses of the precision grip 'ring' shape in the presentations were identified and counted. Results show that a higher percentage of the faculty use some form of the 'ring' precision grip to mark key points in the discourse than do the other groups, and a slightly higher percentage of the native speaker graduate students use it than both the undergraduates and the non-native presenters, even when other spontaneous gestures are common. The relatively more frequent appearance and prominence of the precision grip among more established presenters suggests that this gesture may be increasingly exploited by experienced public speakers as part of a presentational register or style.

This paper then extends the discussion to examples taken from online media in which the precision grip is even more prominently and rhetorically used, including high-profile academic lectures posted online, political speeches and commentary, and online advice from presentation consultants. Here we see strong support for its affordance to performatively index social meaning and identity (see Lempert 2011). Indeed, the availability of the precision grip to emphasize selected points in discourse - and thus to provide evaluation of those points, much as discourse markers can do in speech (Schiffrin 1987) - may facilitate the speaker's ability to indirectly index a social 'stance' (Ochs 1993) of authority and persuasion on the topic, especially when the gesture is used frequently and prominently. This study highlights how salient features of gesture, like speech, can contribute to the construction of social identity in discourse.

Keywords: pragmatics, identity, ring, conventionalization, discourse, register



# Melody as gesture in early vocal interaction between mothers and babies

Ebru Yilmaz, Maya Gratier

Laboratoire Ethologie Cognition Développement (LECD) – Université Paris Ouest Nanterre La Défense – 200, avenue de la République, Nanterre - France, France

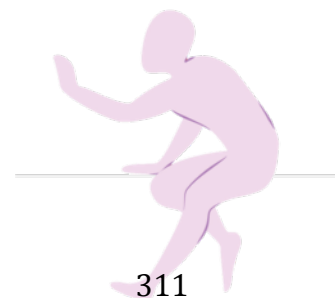
Social interaction between mother and infant has been described as both musical and narrative (Malloch, 1999; Malloch & Trevarthen, 2009). These qualities represent a biologically rooted basis for the achievement of coordination and intersubjectivity in social interaction before speech. This study focuses on sequences of vocal communication between young infants and their mothers and aims to define the narrative frames within which vocal exchange develops. Narratives are defined as patterned sequences of alternating and simultaneous adult and infant behavior involving a rising and waning of excitement around a climactic point. Narrative episodes in preverbal communication include an introduction establishing mutual engagement, followed by a development sequence where emotional engagement is heightened and marked by elevated vocal pitch and intensity in simultaneous or alternating vocalizations, and finally, a conclusion indexed by a slowing of tempo and a drop in excitement. Narratives are identified through the organization of pitch and intensity over time, drawing a bell-shaped curve consistent with the verbal content of the mother's speech and with the infant's expressed levels of excitement.

The present research is based on a corpus of audio recordings of French mothers and their 2- to 3-month-old infants in everyday environments. Acoustic analysis was performed on over 100 recordings of 20 infants aged between 8 and 12 weeks. Sixty narrative episodes were identified within these recordings with different frequencies of occurrence for each infant.

Acoustic analysis methods are used to shed light on the melodic variations in mother and infant vocalizations. Separate melodic contours trace inflexions of both mother's and infant's interacting voices within the narrative episodes. These vocal fluctuations are organized in time and give rise to larger scale melodic gesture that can be described as a narrative arc.

The results of this study will be discussed in light of theoretical and conceptual approaches of gesture and musicality. Based on the argument that 'movement is embedded in sound' (K'uhl, 2011), we will explore how narrative patterns in the vocal domain may be related to gestural expression in the sensori-motor domain. If 'music is audible gesture' (Trevarthen, 2000), it is worth investigating whether gesture arises from a precocious musical bonding between adults and infants. The relation between meaningful 'musical gestures' (K'uhl, 2011) of early interaction and language development will also be discussed in light of Mead's distinction between vocalization and vocal gesture.

Keywords: narrative, melody, gesture, vocal interaction





# Can Co-Speech Hand Gestures and Head Nods Influence Mandarin Tonal Production in L2 and L1 Speakers?

Annie Zheng<sup>1</sup>, Youngsun Cho<sup>2</sup>, Yukari Hirata<sup>3</sup>, Spencer Kelly<sup>4</sup>

<sup>1</sup> University of Texas at Austin – The University of Texas at Austin 108 E. Dean Keeton St., Austin, Texas 78712, United States <sup>2</sup> Korea University – 145 Anam-ro, Seongbuk-gu, Seoul, South Korea <sup>3</sup> Department of East Asian Languages and Literature, Colgate University – Colgate University, 13 Oak Drive, Hamilton, NY, 13346, United States <sup>4</sup> Department of Psychology and Neuroscience, Colgate University – Colgate University, 13 Oak Drive, Hamilton, NY, 13346, United States

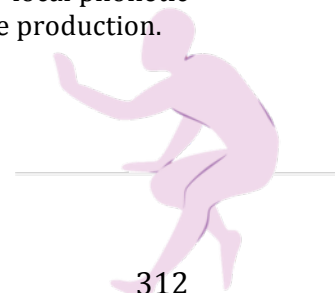
**Background:** Theories have yet to delineate the boundaries of the integrated relationship between speech and gesture (Kelly, in press). Many studies have demonstrated the link between gestures and speech at the semantic level, but the relationship is less clear on the phonological level. For example, Krahmer & Swerts (2007) found beat gestures significantly affected the prosodic prominence of co-occurring speech in native Dutch speakers, but gestures did not help at the within-word level when learning a second language (L2) (Hirata & Kelly, 2010). The present study extends this work, exploring the phonetic role of gesture and head nods at the local level for both native (L1) speakers and L2 learners of Mandarin.

**Methods:** Participants (24 L2 and 12 L1 speakers) viewed three types of videos: Speech Only, Speech+Hand Gestures, and Speech+Head Nods. In the videos, a native Mandarin speaker spoke a word, and for the two multimodal conditions, she also simultaneously modeled its pitch contour through the respective modality. Participants then had to repeat the speech while imitating the bodily action. For example, if the video demonstrated the model saying “ma” in a rising tone (second tone) with hand gesture moving from the bottom left to the upper right, the participants would mimic the model’s speech and hand gesture. Each participant’s response was recorded, and F0 values, the perceptual cue for pitch, were extracted from each trial’s quintile of duration. F0 values were logarithmically transformed into T-values to normalize for individual pitch range.

**Results:** Preliminary analysis for L2 speakers suggested non-significant differences between conditions on T-values across the time course of a word for each of the four tones ( $p > 0.05$ ). This also held true when looking at the tones’ defining characteristics. The second and third tones’ pitch contours are characterized by a dip before rising again with the second tone’s dip occurring earlier in the time course. Examining the pitch range from onset to the dip and from the dip to the offset, we see no differences across conditions as well. The results were replicated in a follow-up study with L1 speakers. Interestingly, L2 participants subjectively reported that the head nods and gestures helped them more clearly articulate the tones.

**Conclusion:** Metaphoric gestures and head nods do not appear to significantly affect Mandarin tone production. Whereas Krahmer & Swerts showed that gestures can phonetically accentuate words in a sentence-thus semantically emphasizing those words- gestures may not penetrate down to differentiating lexical tones across a phoneme. If our final analyses agree with the above results, we will conclude that gestures and head nods may not be designed to serve a purely local phonetic function, suggesting a lower limit to gesture-speech interaction in L1 and L2 language production.

**Keywords:** Mandarin, tones, second language, production



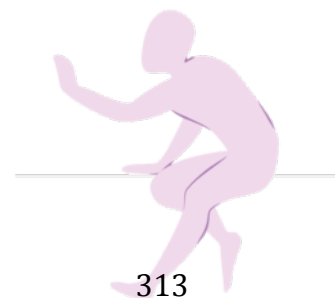
# Manner modulation revisited: what motivates speakers of English to gesture about path and manner of motion?

Elisabeth Zima

University of Freiburg – Germany

A host of studies at the crossroads of gesture studies, typology research and psycholinguistics reports that speakers of satellite-framed languages like English (Talmy 2000) tend to accompany utterances containing manner verbs with path-only gestures (Duncan & McNeill 2000; McNeill 2001, 2005; Negueruela et al. 2004; Stam 2006; Brown & Gullberg 2008). In an attempt to explain this empirical observation David McNeill has proposed the manner modulation hypothesis (McNeill 2001, 2005, 2013). It posits that speakers of English make frequent use of path gestures rather than manner gestures to highlight path and to downgrade the importance of manner in the motion event construal. This downgrading or modulation of manner information by way of gesturing about path is due to the fact, it is argued, that it is almost unavoidable for speakers of English to give manner information since it is prototypically encoded in the verb which is a mandatory element of English utterances (Parril 2011). Therefore, speakers are obliged to give manner information even if this is not the motion aspect that they want to emphasize. Path gestures modulate this preference for manner that is inherent to the English language system ("thinking-for-speaking, Slobin 1987). Conversely, if English speakers do gesture about manner, they do so in order to put explicit focus on manner in the description (McNeill & Duncan, 2000; Parril 2011). That is, manner gestures in English are said to have a highlighting function. This contribution focusses on the power of "manner modulation" to explain the multimodal behavior of adult English speakers who talk about motion events in authentic, non-elicited discourse. The argumentation is based on a corpus study of 885 instantiations of the English motion constructions [V(motion) in circles], [circleVERB], [spin aroundVERB], [rotateVERB], and [orbitVERB]. Examples were extracted from the NewsScape Library of Television News Broadcasts (Steen & Turner 2013) and reflect language as used in US television broadcasts of all sorts from 2005 to present. We show that i) all five motion constructions are frequently used with circular path and manner gesture, respectively, but relative frequencies comparing gesture use between constructions vary greatly, ii) manner gestures are very frequent with manner-only verbs but differences between constructions are significant, iii) manner-neutral verbs do not show lower path gesture rates as manner verbs used in path constructions as one may expect to be predicted by the manner modulation hypothesis, iii) the observation that English speakers tend to accompany utterances containing manner verbs with path-only gestures does not hold and iv) neither path nor manner gesture use correlates with other highlighting strategies (Müller 2008, Müller & Tag 2010). This is taken not to be in line with the manner modulation hypothesis. An alternative explanation in terms of multimodal constructions is proposed.

Keywords: motion events, path gestures, manner gestures, manner modulation, authentic discourse, multimodal constructions



# (In)sensitivity to norms concerning pointing to people and things in Thai and Swedish 4-year and 8-year-old children

Jordan Zlatev <sup>1</sup>, Mats Andrén <sup>2</sup>

<sup>1</sup> Lund University – Sweden <sup>2</sup> Linköping University – Sweden

Adult deictic gestures such as pointing may be influenced by specific societal norms. Kita and Essegbey (2001) showed how a "taboo" on the use of the left hand in Ghana influences gestural practice. Pointing to people is considered impolite in many cultures, but this norm is more explicit in Thai compared to Swedish culture. Are children sensitive to this, and from what age? To investigate this, we conducted an elicitation-based study involving 32 children, divided in (a) preschoolers: 7 Swedish (average 4;8) and 8 Thai (average 4;7) and (b) 2nd grade children: 9 Swedish (average 7;10) and 8 Thai (average 8;8). Each child was asked to sit beside a low table on which three fluffy toys (a dog, a rabbit and a teddy bear) were placed. On the lateral side of the table sat the interviewer (In), and near one of the corners of the room stood the main experimenter (E). The same In and E carried out the elicitation in the four schools; In was female Thai L1, and Swedish L2, and E was L2 speaker of Swedish and Thai. After a few introductory warm-up questions, In asked the child where "the doggie" was. After the child replied, In made up an excuse for leaving the room. Then E moved to the table and took the doggie and hid it in a bag, with a playful smile. On returning, In expressed surprise that a toy gone and asked the child where it was and who had moved it.

In their replies, neither the Swedish nor the Thai pre-school children pointed at the person less than at the toy, as could be expected. For the older groups, however, there was a difference: 7 of the 9 Swedish children used index-finger pointing to refer to the person, but only 3 of the 8 Thai children did so. Furthermore, not one of the latter three was a prototypical outstretched hand point (the elbow was held close to the torso, with the finger pointing briefly in the direction of E). In the remaining 5 cases the children either answered verbally ("the person close to the camera") or used a "polite" open-hand gesture. Interestingly, even the two Swedish children who did not use an index-finger pointing gesture indicated the person in a similar way: one used an unusual thumb-pointing gesture while the other used a "polite" offering-like gesture with a flat hand palm up. In sum, the study suggests that certain gestural norms may be observed first in older children, even in cultures where they are allegedly important.

Kita, S. & Essegbey, J. (2001). Pointing left in Ghana: How a taboo on the use of the left hand influences gestural practice. *Gesture*, 1, 73-94.

Keywords: pointing, norms, taboo, cross, culture





# Posters

# The Incidence of Multimodality in L2 Phonetics Acquisition

Charlotte Alazard-Guiu

U.R.I Octogone-Lordat, EA 4156 – Université Toulouse le Mirail - Toulouse II – France

It has been demonstrated that hand gestures can not only facilitate memory (Goldin-Meadow et al, 2001) but can also reduce speaker's cognitive load (Kita, 2000; Jacobs & Graham, 2006), particularly in a face to face interaction (Mol et al, 2009). However, the interest for gestures in second language acquisition is relatively new whereas gestures could further our understanding of first and second language development (Gullberg, 2006). To our knowledge, the incidence of gestures in the acquisition of L2 phonetics skills has not been explored yet. In this study, we will address this question both from the students' and the teachers' sides. Thus, we will not only analyze the role of gestures in the acquisition of L2 phonetics patterns, but we will also question the type of gestures used and measure if requiring the student to reproduce the teachers' gestures prove to be more efficient. In order to do so, we have selected significant extracts from the MULTIPHONIA database (Alazard et al, 2011). This database consists of class recordings of two different methods of phonetic correction (the 'traditional' articulatory method, and the Verbo-Tonal Method) during a two-month course (3hours a week) with 20 students of French as a Foreign Language. The Verbo-Tonal Method (VTM) provides various and unusual procedures including facilitating gestures in order to work on spotting and assimilating the target language prosodic system (rhythm, accentuation, intonation). More specifically, the teacher helps apprehending speech rhythm in correlation with body/gestural rhythm, as well as perceiving prosodically salient syllables and segmenting the speech flow (Billières, 2002). The students who followed this class showed significant improvement in their production after the two-month training (Alazard, 2013). We hypothesize that the gestures used during the correction could have facilitated the acquisition of prosodic patterns. Furthermore, during the course, students in VTM were asked to repeat sentences with or without facilitating gestures. Following the conclusions of Cook (Cook et al, 2008) for mathematics teaching, we hypothesize that when student did reproduce gestures it had a greater incidence on their productions.

Keywords: multimodality, phonetics, second language acquisition

# Spatialisation of time in co-speech gesturing: how the axis used is influenced by the type of temporal expression

Daniel Alcaraz<sup>1</sup>, Javier Valenzuela<sup>2</sup>

<sup>1</sup>Lancaster University – Bailrigg, Lancaster. UK LA1 4YW, United Kingdom <sup>2</sup>Universidad de Murcia – Spain

In this study, we analyse the co-speech gestures triggered by a number of English temporal expressions as a means of finding out about English speakers' conceptualisation of time. The expressions examined belonged to the three temporal expressions categories suggested by Nuñez & Cooperrider (2013): time span (e.g. during the concert), deictic time (tomorrow) and sequential time (after the concert). Data was retrieved from the NewsScape Library database, an archive of American English TV News which includes videos clips with searchable subtitles. While our results provide support for previous hypotheses, they also spawn a myriad of interesting new questions. For instance, the tendency reported in the literature for English speakers to create online timelines on the lateral axis when conceptualising time has been corroborated; however, contrary to expectation, other axes are also employed when gesturing, in a proportion which has been observed to depend on the specific type of temporal expression. Thus, the use of sagittal gestures went from a meagre 1% in time-span expressions, to 9% in deictic expressions and 24% in sequential-time expressions. The distribution of lateral gestures was also found to depend on the type of expression: time-span expressions were associated with a lateral gesture in 89% of the cases recorded, a proportion which decreased to 72% in deictic expressions and to 66% in sequential expressions. Another finding is that, even though deictic time expressions are ego-dependent, and speakers use the sagittal axis in language, most of the gestures associated with this type of expressions were performed in the lateral axis, hence creating a dissociation between language and gesture. Vertical gestures, which are usually not reported in the literature, have nevertheless been found in this study, albeit marginally, especially with sequential and time-span expressions. Finally, speakers have also been observed to perform gestures that are not congruent with the canonical direction of time (e.g. past is on the left and future is on the right), a fact that has been observed to be influenced by different contextual elements. The picture that emerges is one in which timelines are flexible elements that allow gestures to be performed across different axes and in different directions without changing the basic meaning of the message conveyed.

Keywords: Co, speech gesture, multimodality, time conceptualisation, cognitive linguistics



## Co-creation of a makeup look

Haruka Amatani

University of Tokyo (UT) – Japan

Co-creation of a makeup look Applying make-up on one's face is full of creative moments. Even in doing everyday makeup processes on one's own face, there should be always something new about it, according to skin conditions etc. Moreover, when one applies makeup to someone else, it is a brand new experience for them, with many findings often caused by different facial features and skin types from themselves'. Trying to create a makeup look that is suitable for another, one doing makeup does trials and errors on their face. The most creative moment is when the makeup applier's attempt leads a successful result. The result may be even unexpectedly good. On this moment, the two parties show how they find the result so successful with verbal and non-verbal markers. When their attempts are failed, how do they tell or hint her model about it and corrects their course? That is also a creative process.

In my data, participants are two women, whose relationship is a mother-and-daughter. The mother (M) was a makeup model here and the daughter (D) did the makeup. The video length is about 30 minutes. It was recorded with a camera built in a MacBook Pro, located in their living room. Its screen showed what was being recorded during the recording so that they could look into it like a mirror.

For analysis of movements of makeup application, I applied Kendon's gesture annotating scheme. It has been applied in some studies on everyday movements other than gesture accompanied with speech, such as arm and hand movements with eating (Den and Kowaki 2012).

In the video, there were both moments where D did a successful job on M's face and not a successful one. The successful results such as doing suitable makeup for one's face is at the higher level of creativity than just applying some cosmetic product on one's face, though the latter one still requires some skill.

When her attempt went successfully, D reacts to the result immediately. D's reaction elicits M's interest. When her attempt did not go well, D does not react to the result immediately but gradually. While she does not make a direct remark on what she has done, she suggests another solution for that part.

Keywords: multiactivity, multimodaliry, speech, discourse, interaction, makeup\_\_\_\_\_

# Multimodal levels of prominence – the use of eyebrows and head beats to convey information structure in Swedish news reading

Gilbert Ambrazaitis<sup>1</sup>, David House<sup>2</sup>

<sup>1</sup>Centre for Languages and Literature, Lund University – Sweden <sup>2</sup>Department of Speech, Music and Hearing (KTH) – Stockholm, Sweden

Gestures, including head and eyebrow movements, have been shown to align with pitch accents in speech and in this way contribute to the production and perception of prosodic prominence. However, the way in which these different modalities might interact is still not well understood. Adding, for instance, a head nod to an accented word will increase its prominence, as will adding a rapid movement of the eyebrows. There have also been suggestions that head and eyebrow beats may have cumulative prominence-lending functions. However, it is an open question whether and how pitch accents and eyebrow and head movements may interact in encoding levels of multimodal prominence and whether these prominence levels could be employed by speakers and listeners in the (de-)coding of shades of information structure (IS), such as new vs. given vs. accessible information.

We have examined the occurrence of head- and eyebrow beats in Stockholm Swedish newsreaders as a function of linguistic prominence levels attested for this variety: focal vs. non-focal pitch accents. The corpus consisted of 31 brief news readings from Swedish Television, comprising speech from four speakers (two female) and 986 words in total. It was annotated for focal accents and head and eyebrow beats, independently by three annotators. We counted 229 words accompanied by a head beat, but only 67 occurrences of eyebrow beats, with a vast majority occurring together with a head beat. There were clear effects of focal accentuation: 63% of the eyebrow beats, and 67% of the head beats, respectively, occurred in connection with a focal accent. These figures suggest that we are dealing with six main types of constellations of pitch accent type, head beats, and eyebrow beats: A – focal pitch accent with head and eyebrow beat; B – focal pitch accent with head beat; C – focal pitch accent without gesture; D – non-focal pitch accent with head and eyebrow beat; E – non-focal pitch accent with head beat; F – non-focal pitch accent without gesture.

The low number of occurrences of eyebrow beats (about 2 per piece of news on average), as well as their regular co-occurrence with head beats, might suggest that the use of eyebrow beats is restricted to higher-level prominence and IS coding. The much more frequent head beats might instead be associated with lower-level prominence and speech rhythm – and possibly also to the coding of (other conditions of) IS. Our preliminary conclusion from this study so far is that head and eyebrow movements can represent two quite different modalities of prominence cuing, rather than just being equivalent, cumulative prominence markers. We are currently studying the information-structural conditions underlying different constellations of pitch accents and head and eyebrow beats observed (see A-F above).

Keywords: prosody, pitch accent, focus, beat gesture, information structure

# A Gesture Taxonomy for Tangible User Interfaces

Dimitra Anastasiou, Valérie Maquil, Eric Ras

Luxembourg Institute of Science and Technology (LIST) – 5, avenue des Hauts Fourneaux L-4362 Luxembourg

Gesturing is a natural and intuitive communication means and communication plays a crucial role in collaborative problem solving. Within the Marie Curie project GETUI (Gestures in Tangible User Interfaces), we aim at analysing gestures that are performed in collaborative problem solving situations through a tangible user interface (TUI). GETUI's goal is to explore the use of gestures in interaction with TUIs in the context of technology-based assessment (TBA) of collaborative and complex problem solving skills. TUIs provide a technical mean to assess the 21st Century skills (creativity, critical thinking, decision- making) and higher-order thinking skills (Schraw & Robinson, 2011).

The methodology we follow in GETUI is to run user studies similar to the educational Programme for International Student Assessment (PISA) programme. The participants will be minors (15-18 years of age) and will be instructed to solve a collaborative problem, the task of which will be similar to tasks given in PISA[1].

Firstly, an explorative pre-study with 18 participants is currently being conducted. Different conditions are tested, e.g. various collaborative tasks, amount of input parameters, concrete vs. discrete parameters, dyad vs. triad groups, in order to see which situations elicit more gestures. Then an evaluation study with 60 participants from 3 groups/locales, e.g. 20 francophone, 20 germanophone, and 20 anglophone, will follow.

These studies will result in a big multimodal corpus of speech and gesture (volume≈9 h) that will be accordingly annotated with focus on gesture-speech alignment and temporal coordination (Wagner et al. 2014). A gesture taxonomy will thus be defined (see our preliminary taxonomy at Anastasiou et al. 2014). This taxonomy was based both on the semiotics by McNeill (1992), the affective aspects by Ekman and Friesen (1972), but also the HCI perspective of Quek (1994) and Murphy (2003). Our future taxonomy will include, in addition, locale-specific gestures. Kita (2009) reviewed the literature on cross-cultural gesture variation based on four factors: conventions of form-meaning association, language, spatial cognition, and pragmatics of gesture use.

Moreover, we will assess collaborative complex problem solving and reasoning skills through the MicroDYN framework. This framework allows to formally describe everyday activities by means of variables, outcomes and their interconnectedness, and was used in PISA 2012 and 2015 as conceptualization of complex problem solving.

The coupling of gestures with TUIs for collaborative problem solving assessment is a new direction of gesture studies. In addition, differences of gestural behaviour should not be neglected and Luxembourg is the optimum place, given its multi-lingual and -cultural community. Given the widespread use of TUIs as a natural interaction support in many domains (education, entertainment, medical, urban planning, music), our proposed defined gesture taxonomy will have an impact in many application scenarios.

Keywords: tangible user interfaces, technology, based assessment, complex problem solving, taxonomy

# Therapy targeting the communicative use of gesture in severe aphasia: a single-case study

Caute Anna<sup>1</sup>, Jane Marshall<sup>1</sup>, Naomi Cocks<sup>2</sup>

<sup>1</sup> City University London – Northampton Square, London EC1V 0HB, United Kingdom <sup>2</sup> Curtin University – Kent Street, Bentley, Perth Western Australia. 6102, Australia

**Background** People with severe aphasia can benefit from therapy aiming to teach pantomime gestures as a compensatory strategy (Rose et al., 2013). However, few studies have explored whether these skills generalise to a communicative context.

This single-case study formed part of a group study comparing the benefits of gesture and naming therapy and examining the benefits of communicative therapy. Although research suggests that conversation therapy is only effective when both partners change their behaviour (Wilkinson & Wielaert, 2012), this was the first reported study of gesture therapy to address the communicative skills of both the person with aphasia and their main communication partner. We found participants made greater gains in naming than in gesture. They improved in their ability to convey messages and narratives following therapy for single items, with further gains in conveying messages following communicative therapy.

This single-case study builds on the group study by reporting the case of a participant whose pattern of performance differed from the group norm. It explores the success and limitations of communicative strategies employed by the dyad and describes in detail how therapy aimed to improve their communicative use of gesture.

"Mabel" was 87 and had severe aphasia following a left-sided CVA. She initially received 15- hours of therapy aiming to teach 20 pantomime gestures and 20 spoken words. She then received a further 15-hours of therapy aiming to improve her communicative use of gesture. In this second phase of therapy, individualised goals and strategies were developed. We targeted Mabel's use of gesture alongside other communicative strategies and her husband's ability to elicit and interpret her gestures.

The study used a repeated measures design with a double baseline and two post-therapy assessments. Outcome measures examined the intelligibility of individual pantomime gestures to an unfamiliar observer and the accuracy of spoken naming. Two novel assessments evaluated her ability to convey simple messages and narratives to her husband. All assessments included treated and untreated items.

Following the first phase of therapy, Mabel was still unable to produce any spoken words accurately. Visual analysis of the data suggests that there was an improvement in the intelligibility of her pantomime gestures that was not confined to treated items. However, there was no change in her ability to convey messages to her husband and her performance in conveying narratives was inconsistent. Following the second phase of therapy, Mabel's ability to convey messages improved. Her ability to convey narratives to her husband remained inconsistent.

**Discussion** Results indicate that Mabel learnt a small number of pantomime gestures following therapy targeting individual items. However, therapy specifically targeting the communicative use of gesture was required to provoke gains in conveying information to a partner.

**Keywords:** Clinical gesture studies, aphasia, atypical language/communication

# How iconic hand gestures can change children's memory representation of action events.

Suzanne Aussems, Sotaro Kita

Department of Psychology, University of Warwick – CV4 7AL Coventry, United Kingdom

It is difficult for young children to pinpoint what aspect of a complex scene a new verb refers to (e.g., Gentner, 1982; Gentner & Boroditsky, 2001; Imai et al., 2008). Imai, Haryu, and Okada (2005) showed that children are perfectly capable of encoding actions, and therefore they suggest that the difficulty children experience lies not within encoding a complex event. However, their study also revealed that children generally remember other aspects of a complex scene better than actions. In particular, three-year-olds remember actors much better than actions (Imai et al., 2005). This may contribute to children's difficulty in extending an action label to new situations in which the same action is shown, but the actor has changed. That is, it is difficult for children to understand that these situations include the same action as before when other aspects of the scene have changed. One way for children to overcome this struggle is to attend to iconic gestures that often accompany verbs to illustrate what is said (Özcaliskan, Gentner, & Goldin-Meadow, 2013). Gestures are iconic when they represent actions or attributes associated with people, animals, or objects in the world (e.g., zigzagging the hands to represent a fish swimming). Our aim is to investigate whether seeing a complex event accompanied by an iconic gesture that maps onto the action in the event can alter children's memory representation.

We are planning to collect data from an experiment that presents three-year-old children with videos in which actors move across a scene in a novel manner. When children are watching a video the experimenter will say "Wow! Look at what s/he is doing!" and produce either an iconic gesture depicting the manner in which the actor moves, an interactive gesture not providing any information about the manner of moving (Bavelas, Chovil, Lawrie, & Wade, 1992), or no gesture at all. Several hours later, children will be required to point out the video that they watched before in a forced-choice paradigm where previously shown videos are paired up with distractor videos that either present the same actor doing a different action, or a different actor doing the same action. If children choose the videos that they have seen before over the distractor videos in which the actor or action has changed, then this indicates they remembered the actions and actors, respectively. We predict that children in the iconic gesture condition have a better memory for actions and a worse memory for actors than children in the interactive gesture and no gesture conditions.

We aim to present the results of this experiment at the conference and discuss the implications of the role of gesture in memory and verb learning.

Keywords: iconic gestures, action memory, actor memory, recognition task

# Multimodal Reference Tracking in Dutch and Turkish Discourse: Role of Culture and Typological Differences

Zeynep Azar<sup>1</sup>, Ad Backus<sup>2</sup>, Aslı Özyürek<sup>1,3,4</sup>

<sup>1</sup>Center for Language Studies, Radboud University Nijmegen (CLS) – Netherlands <sup>2</sup>Tilburg University (TiU) – Netherlands <sup>3</sup>Donders Institute for Brain, Cognition and Behaviour – P.O. Box 9101 6500 HB Nijmegen, The Netherlands <sup>4</sup>Max Planck Institute for Psycholinguistics – Wundtlaan 1 6525 XD Nijmegen, The Netherlands

Previous studies show that during discourse narrations, speakers use fuller forms in speech (e.g. full noun phrase (NP) and gesture more while referring back to already introduced referents and use reduced forms in speech (e.g. overt pronoun and null pronoun) and gesture less while maintaining referents (Gullberg, 2006; Yoshioko, 2008; Debreslioska et al., 2013; Perniss & Özyürek, 2015). Thus, quantity of coding material in speech and co-speech gesture shows parallelism. However, those studies focus mostly on Indo-European languages and we do not know much about whether the parallel relation between speech and co-speech gesture during discourse narration is generalizable to languages with different pronominal systems. Furthermore, these studies have not taken into account whether a language is used in a rich or low gesture culture as a possible modulating factor. Aiming to fill this gap, we directly compare multimodal discourse narrations in Turkish and Dutch; two languages that have different constraints on the use of overt pronoun (preferred in Dutch) versus null pronoun (preferred in Turkish) and vary in terms of whether gender is marked in the pronouns (Dutch) or not (Turkish).

We elicited discourse narrations in Turkey and Netherlands from 40 speakers (20 Dutch; 20 Turkish) using 2 short silent videos. Each speaker was paired with a naive addressee during data collection. We first divided the discourse into main clauses. We then coded each animate subject referring expressions for the linguistic type (i.e., NP, pronoun, null pronoun) and the co-reference context (i.e., re-introduction, maintenance). As for the co-speech gesture data, we first coded all types of gestures in order to determine whether Turkish and Dutch cultures show difference in terms of the overall gesture rate (per clause). Later we focused on the abstract deictic gestures to space that temporally align with the subject referent of each main clause to calculate the proportion of gesturally marked subject referents.

Our gesture rate analyses reveal that Turkish speakers overall produce more gestures than Dutch speakers ( $p < .001$ ) suggesting that Turkish is a relatively high-gesture culture compared to Dutch. Our speech analyses show that both Turkish and Dutch speakers use mainly NPs to re-introduce subject referents and reduced forms for maintained referents (null pronoun for Turkish and overt pronoun for Dutch). Our gesture analyses show that both Turkish and Dutch speakers gestured more with re-introduced subject referents when compared to maintained subject referents ( $p < .001$ ). All results put together, we show that speakers of both languages organize information structure in discourse in similar manner and vary the quantity of coding material in their speech and gesture in parallel to mark the co-reference context, a discourse strategy independent of whether the speakers are from a relatively high or low gesture culture and regardless of the differences in the pronominal system of their languages.

Keywords: discourse, multimodal reference tracking, Dutch, Turkish, cospeech gesture



## Vive la différence! Why bilinguals gesture

Jasmine Aziz, Elena Nicoladis

University of Alberta – Canada

Gestures serve a variety of functions in communication, including aiding language access or retrieval (Krauss, Chen, & Gottesmann, 2000) and helping construct a message, particularly in spatial tasks (Kita, 2000; Alibali, 2004). These functions have been particularly strongly linked with representational gestures. Some researchers have argued that gesture frequency is linked to proficiency in bilinguals (Nicoladis, Pika, & Marentette, 2009). Since bilinguals are often more proficient in one language than the other (de Houwer, 2010), they might use gestures to aid in language access more in their weaker language than in their stronger language. Indeed, some studies have shown precisely that (Nicoladis, et al., 2009). Other studies have shown the opposite results, with bilinguals gesturing more in their stronger language than their weaker. (Gullberg, 1998)

To reconcile these conflicting results, Nicoladis (2007) proposed that bilinguals' proficiency might interact with the task that they are solving, with the more spatial the task, the greater the effects of proficiency. The purpose of this study was to test that proposal.

We operationalized the French-English bilinguals' proficiency in two ways: 1) by categorizing them by first language and 2) by measuring their vocabulary scores with a standardized vocabulary test in both languages. Half the participants had learned French as their first language and English as their second and the other half of the participants had learned English as their first language and had attended French programs, such as immersion, as children.

We asked the participants to do two tasks in both of their languages: 1) watch a cartoon and tell the story back and 2) talk about how they learned French and English. Telling a story relies heavily on spatial memory, so we predicted that this task would elicit more gestures than talking about language histories. The French and English sessions were done on two different days with different experimenters, who were native speakers of the language spoken in their session. The order of the sessions was counterbalanced, and all of the tasks were videotaped. The participants' speech was transcribed orthographically and the representational gestures coded. To control for differences in how long individual speakers spoke during each task, we calculated a gesture rate, the number of gestures per 100 word tokens.

The results showed the predicted task difference: participants gestured more when telling a story than when speaking about their language histories. There were, however, no effects of proficiency and no interactions between proficiency and task. Individual participants showed a strong tendency to gesture according to their own individual style: there were high correlations between languages and between tasks. These results suggest that individual speaking and gesturing styles far outweigh the effects of proficiency in bilinguals.

Keywords: bililinguals, proficiency, task effects, individual differences

# Conversational analysis in an educational space "equipped"

Marguerite Baste

Textes, littératures : écritures et modèles (TELEM) – Université Michel de Montaigne - Bordeaux III : EA4195  
– Université Michel de Montaigne Domaine universitaire 33607 Pessac cedex, France

The main interest of this study is the observation of dynamic interactional in an educational environment mediated by a computing device. It will study the construction of pedagogic discourse by analyzing conversational dynamics between different actors (trainers and learners). The human-machine communication problem underlying is primarily structured around interactionism (Goffman, 1973) and conversation analysis (Sacks, Schegloff and Jefferson, 1974), and also integrates theory of situated action (Suchman, 1987).

The theory of situated action is a continuation of the work of Goffman and develops an interpretive approach of objects in action. It involves opening the ethnomethodological search field and the deployment of a new theoretical framework for the analysis of cognitive phenomena. Focusing attention on the interpretation of the situation procedures implemented in verbal interaction, the work of Suchman authorize the seizure of the specific role of technical artifacts in the working knowledge (Suchman 1987: 50).

Non-verbal gestures dimension is complex because of the multiple functions of gestures and their various relationships with language, body, referents and speakers. A semiotics of communicative gesture faces a number of problems such as the lack of segmentation and linear combination of elementary units. We mainly retain in this study the work of Cosnier (1984, 1987, 2006, 2012), of Calbris (2011) and Tellier (2008), according to the gesture dimensions offered by McNeill (1992).

According to Cosnier, the proper interpretation of the various verbal and non-verbal cues is a prerequisite of interaction and is the consequence of "empathic postulate" that "others are able to feel and think like me and think that I am able to like him." Communicative gestures are necessarily related to the discursive exchange, and we especially take an interest in the specific verbalizations over gestural anticipation (Morel, 2011) during the exchanges in this triangular pedagogical situation (trainers, learners, device).

Through analysis of transcripts of audio-visual sequences, we will try to refine the functions of teaching gestures defined by Tellier (2008) using semiotic analysis gestures Calbris (2011) to update events new on the correlations between non-verbal cues and verbalizations. This will establish, for example, the importance and significance of the viewing direction or pauses in interpersonal communication, as well as the types of enunciation strategies which, in synergy with non-verbal cues help the co-construction of interactional dynamics between trainers and learners, finalized to expand the knowledge of the latter.

Keywords: Human Machine Communication, Educational space, Discourse analysis, Multimodal transcription

## L2 Learner gestures in classroom interactions : help to production or to communication?

Charlotte Blanc-Vallat, Ines Saddour

Unité de Recherche Interdisciplinaire (Octogone - Lordat) – Université Toulouse le Mirail - Toulouse II : EA4156 – Maison de la Recherche Université Toulouse Jean-Jaurès, 5 Allées A. Machado 31 058 Toulouse Cedex 9, France

In the past thirty years, research in language acquisition and learning have been more and more interested in the study of gesture as part of the communication process (Cosnier, 1982; Colletta, 2005). In fact, as the work of McNeill (1992, 2005) shows, language and gesture are co-expressive partners in the generation of thought and they are both planified on the conceptual level. Therefore, in order to investigate human communication, some researchers have paid attention to pedagogical gestures, those produced by language teachers in the classroom (Tellier & Stam, 2010; Tellier & Cadet, 2014), some others were interested in learner gestures in second language acquisition (Gullberg, 1998, 2005, 2011; Stam & McCafferty, 2008; Stam, 2012). Despite their valuable contributions more research is needed to clarify the role of learner gestures in L2 acquisition. This study aims to investigate non-verbal communication and specifically gestures produced by French L2 learners at the beginner level during interactions with their language teacher in a classroom situation. We are particularly interested in analysing the types and functions of the different gestures used to solve lexical difficulties (Gullberg, 1998; Stam, 2012). The gestures that interest us are those that have semantic content not only during message planification and formulation, but also during lexical search, repairs or reformulation.

In order to do so, we analyse a corpus of learner-teacher interactions elicited in the classroom to discuss topics where specific vocabulary is needed. Without any prior preparation, 11 learners with a beginner level at the Defle department had to relate a situation they had supposedly lived and to convince the interlocutor (the teacher) of the truthfulness of their stories by giving specific details about what happened[1].

The vocabulary needed to do the task was not necessarily learnt in class. The participants were therefore expected to use gestures as a solution to solve their lexical difficulties. The data (each interaction lasted 4 to 5 minutes) were video-recorded and transcribed, annotated and coded using ELAN. The annotations were inspired by the McNeillian classification and also the developments suggested by Tellier & Stam (2010) and Tellier, & al. (2011).

Our results show that very frequently, learner gestures are used to solve lexical problems. Indeed they are used to replace the words that are not yet acquired. Furthermore, they serve as a communication strategy to prevent the interruption of communication. It seems therefore that our results confirm both the production hypothesis according to which speakers use gestures to facilitate their language production process, and also the communication hypothesis that postulates that gestures serve primarily a communicative function, that of maintaining interaction and interlocutor's attention (Jacobs & Garnham, 2007).

Example : " Vous avez été l'acteur principal d'un film comique dans votre pays "

Keywords: Multimodal communication, L2 learner gestures, Strategies in L2, teacher, learner interactions

# Signing and gesturing in later life. How to adapt bodily talk in context?

Catherine Bolly<sup>1</sup>, Sílvia Gabarro-López<sup>2</sup>, Laurence Meurant<sup>2</sup>

<sup>1</sup> University of Cologne – Germany <sup>2</sup> University of Namur – Belgium

It is now assumed that both speakers and signers use gestures in language interaction as these units are an integral part of linguistic communication [1] and window onto the speaker's mind [2]. It is also admitted that sign languages (SLs) offer the unique property to grammaticalize both manual and nonmanual gestures [3]. This paper aims to foster the knowledge on these issues by studying the palm-up gesture [4, 5] in combination with nonmanuals (including facial displays, gaze, head and shoulders' moves), comparing their more or less pragmaticalized use [6] by older locutors in Belgian spoken French and French Belgian Sign Language (LSFB). This study follows from a corpus-based method of video data analysis (using the ELAN software) and a form-based approach to gesture and sign. The corpus data comprise four samples of video data (duration: approx. 15 min.) that are made up of interviews with two hearing French-speaking women (75 and 84 y. old; CorpAGEst corpus) and two deaf LSFB-signing men (75 and 84 y. old; LSFB corpus).

Similarly to pragmatic markers [7], palm-ups are said to be multifunctional [8] and can cover a wide range of pragmatic functions (e.g. expression of modality, backchannel signal, turn initiating or ending, or pause filler) (see [9] and [10] among other taxonomies in SLs). Taking for granted that there is an increasing need for a certain gestural economy with advancing age [11] and a high individual variability in old age [12], we investigated the nonmanuals that are layered with palm-ups to see the functions that such combinations fulfill in each language.

So far results show that the four informants vary in their way of producing palm-ups. In French spoken language (SpL), the younger speaker produces much more palm-ups than the older one (10.5/min vs. 0.5/min), whereas the LSFB signers produce a similar number (8/min vs. 6/min). Even though mainly falling within the expressive domain (viz. conveying the speaker's attitude, emotions, judgments, or stance), the most frequent functions vary from one language to the other. Notably, nonmanuals layered with palm-ups for attitude are expressed in SL by means of two-handed palm-ups combined with a non-addressed gaze and closed mouth (if no other parallel function), while in SpL they can be one-handed or two-handed, and mostly combine with back-and-forth gazing (with a not addressed piek), eye-closing, eyebrow raising, and head turns. Furthermore, the use of nonmanuals layered with palm-ups appeared to be more standardized in signers than in speakers.

This research is the first crosslinguistic study on the use of palm-ups and nonmanuals between a SpL and a SL in later life, also presenting a refined, interoperable model for the annotation of pragmatic gestures and their functions at the gesture-sign interface.

Keywords: Interaction, Pragmatic gestures, Older people, Corpus, based, Sign Language, Spoken Language, Multimodality

# Gesture as a Resource for Multitasking in the Discourse of Teaching and Learning

Catherine Box

Columbia University, Teachers College – Teachers College, Columbia University in the City of New York 525 West 120th Street New York, NY 10027 USA, United States

While several generations of researchers have documented extensively teacher and student talk in the classroom (e.g. Mehan 1979; Nakamura, 2008; Nystrand, 1997), studying the body in educational settings has received considerably less attention. Indeed, scholars have explored embodied cognition, demonstrating that a student gesturing while working through a concept promotes learning (Alibali & Goldin-Meadow, 1993; Pine, Lufkin, & Messer, 2004), that students gesturing can serve as a scaffold to co-constructing meaning (McCafferty, 2004), and that a teacher gesturing while instructing facilitates learning (Singer & Goldin-Meadow, 2005; Valenzeno, Alibali, & Klatzky, 2003). Our work contributes to this nascent but growing field. In this presentation, we examine gestures as a performance tool for teachers to accomplish tasks as they arise. More specifically, we analyze the ways in which gesturing allows teachers to successfully manage two or more tasks simultaneously. Our videotaped data come from three educational contexts: (1) English as a Second Language (ESL) classrooms with adult immigrants in the United States, (2) mathematics tutoring sessions with children from the Pacific Northwest, and (3) post- observation conferences between New York City public high school teachers-in-training and their supervisors. In each setting, teachers/supervisors use their bodies to multitask, as they strive both to (re)create the teaching space with their students and to navigate institutional demands such as time constraints and classroom management.

In the classroom, we show that an ESL teacher deftly navigates a range of semiotic resources (Goodwin, 2013) as he attends to both the selected and the unselected next speaker in ways that maintain classroom order without undermining student-initiated participation. In tutoring sessions with young children, we demonstrate that a math tutor's mirroring of the child's non- verbal actions allows her to simultaneously follow the agenda of the lesson plan and encourage student agency. Finally, we explore a teacher trainer's use of deictic gestures during a post- observation conference to recreate the classroom as it existed during the observation. Through pointing to seats to refer to students that had in some way impacted the trainee's performance during the observed class period, the trainer is able to manage time, as well as mentor a budding teaching.

For each case that we examine, the teacher engages the body, largely successfully, to handle institutional constraints while privileging the pedagogical task at hand. While our project extends the existing work on gesturing in the discourse of teaching and learning, we also offer a practical analysis of how gestures may be deployed to multitask, a skill we believe to be integral to a teacher's pedagogical repertoire.

Keywords: gesture in interaction, discourse of teaching and learning

## Clown theater and aphasia: the experience of "Palhafasia"

Lenisa Brandao, Camila Grigol, Nathana Moreira, Jéssica Duarte, Jordana Balbinot, Magda Bauer, Melissa Dornelles, Luana Michellotti

Universidade Federal do Rio Grande do Sul - UFRGS (BRAZIL) (UFRGS) – Rua Ramiro Barcelos, 2777, Sala 314, Bairro Santa Cecilia - Anexo I da Saude, Brazil

Theater is a refined form of communication that depends on intentionality and bodily expression. There is evidence that theater promotes cognitive and social benefits for adults with acquired brain damage. The literature also documents the interest of neuroscience in understanding the neural and cognitive underpinnings of the intentional aesthetic and creative state caused by theater. Many approaches relate this state to spontaneity and, particularly, the clown's state allows communicative freedom. A clown's language is broad in its possibilities of action and interaction. At the same time, it offers an opportunity to get in touch, deal with and accept human frailty and feelings of ridicule. For these reasons, our research group chose to investigate the clown language as a mean of expression for aphasics. Aphasia is an acquired language disorder caused by damage to the brain. Aphasic theater is an emerging and promising field which is developing in many countries as an initiative of speech therapists and actors. The current preliminary on-going study reports the experience of a clown group named "Palhafasia". It is composed by eight expressive aphasics as well as seven non aphasics (two speech therapists, two actresses and four speech therapy students). Speech therapists and students were initiated in clown and the process of initiating the aphasic members was guided by the actresses who are both clown specialists. The activities take place in Arena Theater once a week during the academic year or twice a week (two months before each presentation). The group works mainly with fun games, which gradually give their way to activities that provoke experiences of emotional expression and improvisation, as each member is stimulated to discover his or her clown. Improvising scenes with pairs in interaction with the public requires joint attention, empathy, initiative, theory of mind, reciprocity as well as understanding and expressing humor. All clowns are encouraged to use both or either verbal and non-verbal language. We exercise various communication channels, particularly gestures and facial expression. Through this approach, the communication conditions of aphasic and non aphasic members are equal, and so are their conditions of frailty to failure in the expression of comic actions. Verbal difficulties such as hesitations, anomia and paraphasia are perceived as interesting situations to be enjoyed on scene, yielding complicity and laughter. Acceptance of verbal failures often leads to joint development of creative solutions. Such experiences inevitably provoke reflections about the way aphasics are treated in the health system and in society. Additionally, the experience also raises insight on the power of art as an instrument for multimodal expression. Changes in communication during the activities are being documented through video recordings and will be analyzed by three independent judges from the areas of Speech-Language Therapy and Theater.

Keywords: aphasia, theater, clown, multimodal communication



# What we see or what we do? Getting a grip on the source of representational gestures

Amanda Brown, Jonathan Keane, Diane Brentari, Susan Goldin-Meadow

University of Chicago – United States

Often without awareness, people convey information with their hands while talking which is not expressed in their speech (Mc Neill, 1992; Goldin-Meadow, 2003; Beilock & Goldin-Meadow, 2010). Until recently, our understanding of these behaviors has been driven by what we can plainly see, but, advances in kinematic technologies such as motion capture have allowed more sensitive measures of movement to inform this understanding. For example, subtle hand movements revealed a dissociation between how visual information is used to perform actions and describe objects (Goodale & Milner, 1992) Hand movements were measured while participants picked up or described (using their hands) objects placed on a background image, creating a three-dimensional visual illusion (see figure 1).

Participants perceived the objects to be different sizes based on the presence of the illusion background. These illusory perceptions were present in their hands when participants were asked to estimate the sizes of the objects using their thumb and forefinger. However, when participants reached to pick up the objects, the hand calibrated the opening of the thumb and forefinger according to the absolute sizes of the objects, regardless of the participants' erroneous perceptions. In other words, size-contrast illusions, "deceive the eye, but not the hand" (Aglioti, De Souza & Goodale, 1995).

This dissociation of action and perception provides a profound opportunity for research on the mechanisms of co-speech gesture. Co-speech gestures serve to describe visual information for an interlocutor, but they may also simultaneously simulate action on objects without the objects present. When a dissociation exists between a speaker's visual imagery and motor imagery, which will co-speech gesture represent?

We modified the Muller-Lyer Illusion grasping paradigm (Westwood, Chapman & Roy, 2000) to include a gesture task. 15 participants picked up an object (5cm or 7cm in length) from the three-dimensional Muller-Lyer Illusion display (in closed and open contexts) and then performed an action with the object they picked up. After the display was removed, participants described the action they performed with the object and were allowed to use their hands while talking. Finally, in separate blocked trials participants picked up or produced a manual estimation of object size with their thumb and forefinger. We replicated previous results demonstrating that the maximum grip apertures produced "in flight" on grasping tasks corresponded to the absolute sizes of the objects, regardless of the illusory cues, whereas manual estimations of size corresponded to the perceived sizes of the objects, modified by illusory cues. For co-speech gesture, we found that participants who produced representations of the objects with their hands represented differences between objects as small as 2 cm. That is, participants gestured with smaller grip sizes for slightly smaller objects than for slightly bigger objects, even when the size of the object was irrelevant to the communication task. However, we found no effect of the visual illusion on participants' gestures. Co-speech gestures were also extremely variable compared to grasping action and manual estimations. Our findings suggest that co-speech gestures represent bodily actions to a subtle degree even when the communication task does not demand such precision. However, there may be a threshold of size below which the precision of spontaneous co-speech gesture may not extend. Future directions include examining the gradient of gestured representations of object size in native English speakers as compared to ASL signers.

## Posters

Keywords: Co, Speech Gesture, Action, Perception, Visual Illusion, Grasping



## Can reporters' involvement in the news be detected by looking at their gestures and listening to their pitch?

Grazia Busa, Alice Cravotta

University of Padova (ITALY) – Italy

In reporting on emergency situations (i.e., floodings, hurricanes) reporters must inform the audience about the event and provide details about how the event took place. As part of their profession, they are required to take a neutral stance and appear detached from the event they are reporting. This is crucial for preventing panic to spread in the audience. However, while reporters may easily control the content of their news, controlling the messages delivered through body gestures and voice may be harder. The aim of this study is to investigate how journalists reporting on emergency situations may communicate involvement in the reported event through their gestures and voice. The hypothesis is that reporters' involvement is signalled by a higher gesture rate and greater pitch variation as compared to less involved, more professional reporting style.

The study investigates a corpus of 30 videos of news reports on floodings occurred in Italy around November 2014. The news reports are taken from three nation-wide channels, Skytg24, Rainews24, Raitv.

All the reporters are Italian. [Future studies will extend the investigation also to reporters from countries other than Italy.] The videos were downloaded from the web using the program Camtasia Studio and are approximately one-minute long each.

The gestures and body movements of the reporters were analysed qualitatively and quantitatively with Elan. The analysis focussed on the reporters' use of deictics and beats; measures were taken of the frequency, durations, and amplitude of the gestures; measures of gesture rate in relation to pitch were also calculated.

The pitch of the speakers' voices was analysed with Praat. For this analysis, the audio channel was separated from the video channel using the AVC software. The degree of speakers' variation in pitch during the reports was measured using the Pitch Variation Quotient, that is a calculation of the standard deviation of the fundamental frequency (F0) of the speakers' voices divided by the mean. The variations in the reporters' voices were then correlated with the reporters' gesture rate. The effects of the variability in the reporters' voice and gestures on the audience will be tested with a perceptual test.

The preliminary results seem to confirm the expectations. The reporters alternate between moments in which they appear 'more professional' to moments when they appear more involved in what they are reporting. In the first case they use fewer and smaller gestures, make little to no use of beats and deictics, and their voice pitch is less varied. In the second case, they use more, bigger and more varied gestures, and their pitch is more varied. These results point to the existence of a correlation between speakers' gesture rate and pitch variation, which may signal the speaker's involvement in the reported event.

Keywords: emergency communication, cospeech gestures, voice pitch, video corpus, beats, deictics.

# Gesture in the pathos formula: the case study of Trude Fleischmann's photographs

Aurelie Cachera

Centre d'études et de recherches sur l'espace germanophone (CEREG) – Université Paris III - Sorbonne nouvelle : EA4223 – 94, avenue des Grésillons 92600 Asnières, France

Fascination for nervous illnesses, and hysteria in particular, arose at the end of the 19th century. In Paris, Charcot's Tuesday Lessons at the Pitié-Salpêtrière Hospital, which were real stagings of female patients with hysterical symptoms, were attended by more and more people and contributed to creating a certain collective imagination of hysterical gestures and representations. This disease was presented in various manners at the time, such as exaggerated fits by female patients in Charcot's lessons, the pictures that were taken at this Hospital and later featured in *l'Iconographie photographique de la Salpêtrière* (1876-1879), but also in literature in which it became a recurring theme. In this context, Freud's *Studies on Hysteria* (1895) is a striking example of how medicine took an interest in these fits and how they were used as a literary motive.

A quarter of a century later, a collective imagination had been built around this raging female body, which became a "pathos formula" as defined by Aby Warburg. Female models in the pictures taken by the Viennese photographer Trude Fleischmann, such as the nude series of dancer Claire Bauroff, seem impregnated, explicitly and unconsciously, with Charcot's patients' hysterical gestures and their descriptions. It can therefore be assumed that there is a link, a continuity, between these exaggerated fits, their depiction in photographs and in literature, and the postures later adopted by the dancer. The raging hysterical body, its expressiveness as well as its specific gestures, are much more than a simple diseased body, they are a means for artistic creation.

In what way did the reappropriation of these gestures contribute to creating a specific and poetic model for Trude Fleischmann? In order to answer this question, one can analyse her nude series of Claire Bauroff with the help of the pictures taken at the Salpêtrière as well as Freud's *Studies on hysteria*, in which the narrative strays mirror the genre of the short story. The notion of "representation" and its role in hysteria will also have to be addressed. Nowadays, hysteria is considered to be a disease in which visual representation is essential. This is due to the fact that neurotic patients suffering from hysteria cannot mentally depict internal conflicts and express them orally, which they therefore express physically, thus creating a conversion disorder. The body and its gestures constitute a way of expressing what the subject is incapable of thinking, voicing, and even writing.

Gestures as a means for artistic creation and communicating the unutterable will thus be analysed through the postures in Trude Fleischmann's photographs, using Aby Warburg's concept of pathos formula.

Keywords: gesture, hysteria, trude fleischmann, representation

## Co-speech gesture impairments in people with Alzheimer's disease

Diane Caussade <sup>1</sup>, Diane Caussade, Jean-Marc Colletta <sup>2</sup>, Nathalie Henrich <sup>3</sup>, Nathalie Vallée

<sup>1</sup> GIPSA-lab (CNRS) LIDILEM – Gipsa-lab, Lidilem – France <sup>2</sup> Laboratoire de Linguistique et Didactique des Langues Etrangères et Maternelles (LIDILEM) – Université Grenoble 3 – France <sup>3</sup> Grenoble Image Parole Signal Automatique (GIPSA-lab) – CNRS, Grenoble INP, UJF, Université Stendhal – 961 rue de la Houille Blanche - Domaine universitaire - BP 46 38402 Grenoble Cedex, France

In Alzheimer's disease (AD), few studies on bimodal language production (e.g. Carlomagno et al. 2005; Glosser et al. 1998) treat aspects of speech and hand gestures in concert. Recent studies have shown the positive impact of music both on speech production (Moussard et al. 2011; Charrière & Bally 2009) and on co-speech gestures (G'otell et al. 2003). For this study, we designed an original protocol to evaluate the impact of music on oral and manual communication modalities in people with AD. The repetition tasks consisted of 8 nursery rhymes created for this protocol, either spoken or sung. Four nursery rhymes (two sung, two spoken) were completed with four iconic and two deictic hand gestures. Weekly workshops based either on speaking or on singing activities were organized for twelve weeks in a day center and nursing home. Twenty French-native right-handed participants diagnosed with AD paired by age and socio-educational level were evaluated. Their MMSE scores were found from 24/30 to 8/30 by our hospital partner. Each participant was recorded individually using a camcorder and a lapel microphone. The speech productions were annotated and analyzed with Pra<sup>©</sup>, and ELAN<sup>©</sup> for hand gestures. This paper focuses on rate, type and handedness of gestures produced spontaneously or by repetition, as well as semantic coherence between the gestural and spoken productions, and the quality of execution of the presented gestures. The participants with mild cognitive impairment (19-24/30) repeated correctly most of the iconic and deictic gestures presented, and produced also spontaneous beats and metaphoric gestures. The participants at moderate AD stage (10-18/30) repeated and produced fewer gestures than those at the mild stage. While those with a severe cognitive impairment ( $\leq 9/30$ ) did not repeat nor produce any kind of gestures. With disease severity, voluntary imitation appears less controlled. Also more semantic incoherencies were observed between the iconic gestures and speech. With regards to the quality of gesture productions, hand configuration and orientation were simplified by patients with mild or moderate cognitive impairment. At later stages, hand movement and location were also affected. Concerning the handedness, mirror errors were observed both for iconic and deictic gestures at the mild and moderate stages. Decentering disorders occurred in deictic gestures. These two phenomena may be explained by spatio-temporal and abstraction impairments developed in the AD early stages, as well through a disorganization of the body schema (Viader et al. 2000). At the moderate stage, some participants produced bimanual iconic gestures with a single hand.

In conclusion, this study showed differences in production of hand gestures depending on the degree of cognitive impairment. Similar behaviors were observed in speech and singing. However, the workshops did not seem to improve the production of co-speech gestures.

Keywords: Alzheimer's disease, co, speech gestures, music

## Effects of stress-level on hand-movement behaviour with focus on Self-touch in pre-and post-pubertal girls

Kyra Densing, Melanie Seiler, Ippokrates Konstantinidis

Department of Neurology, Psychosomatic Medicine, and Psychiatry, Institute of health promotion and clinical movement science, German Sport University Cologne – Germany

Self-touch may serve for arousal regulation, both of hyper- and hypoarousal, as it may be observed in presence as well as absence of external stimulation. It remains unclear if Self-touch with varying structural features occurs in different contexts, and if this potentially regulatory mechanism is learned or inherent. The aim of this study was to discover if the rate of Self-touch increases with higher stress-levels, to identify structurally different forms of Self-touch used in different contexts, and to find out if there are age differences in stress-processing between pre-pubertal and post-pubertal test persons. We compared hand movements of 10 pre-and 10 post-pubertal human girls in non-stress and stress settings. As non-stress setting we used an interview about a positive experience, whilst the arithmetic part of the Trier social stress test was used as stress-inducing setting. All settings lasted 5 minutes and were filmed, resulting in 200 minutes video data (50 minutes per setting for each pre- and post-pubertal girls). All occurring hand movements as well as structural components of Self-touch were analyzed with the NEUROGES-ELAN system by two independent raters.

We identified and described three groups of Self-touch. We found a decrease in repetitive Self-touch as well as a significant decrease in the proportion of time of Self-touch 1 (irregular, single-accent movements on the arm with low intensity) in the post-pubertal girls in the stress situation compared to the non-stress situation. The post-pubertal girls furthermore displayed less hand movements, including phasic and repetitive movements in space in the stress setting. No changes in hand movements between the non-stress and stress setting were found for the pre-pubertal girls. The post-pubertal group displayed a significantly stronger decrease in activation and phasic movements in the stress situation compared to the pre-pubertal girls.

Our results suggest that the puberty influences regulatory mechanisms for stress-regulation, and structurally different groups of Self-touch might be used in different contexts.

Keywords: Self, touch, stress regulation, hand movements, puberty



# The power of symbolic representation in the manual modality: a comparison between co-speech gestures and signs in a narrative context

Alessio Di Renzo<sup>1</sup>, Olga Capirci<sup>1</sup>, Tommaso Lucioli<sup>1</sup>, Virginia Volterra<sup>2</sup>

<sup>1</sup> Istitute of Cognitive Sciences and Technologies - CNR (ISTC) – Italy <sup>2</sup> Istitute of Cognitive Sciences and Technologies - CNR (ISTC) – Italy

Gesture does not share the complexity of linguistic structure observed in sign languages, but it is possible that the representational techniques used in both systems are related to some extent by virtue of their shared manual modality. Continuities of form between sign language and gesture have been noted by researchers studying co-speech gesture in adults (Kendon, 2008), children (Pettenati, Stefanini & Volterra, 2010), and in sign language (Cormier, Smith, & Sevcikova, 2013). However co-verbal gestures have compositional structure and semantic significance, visible bodily actions (Kendon, 2004) used by speakers have never been regarded as part of their language, and were never included in linguistic descriptions. On the other hand, the highly iconic structures observed in sign languages (Cuxac, 2000) have been often considered as ‘non- linguistic’. Furthermore, it is important to note that signers produce other ‘gestural’ elements to support the signed discourse (Boyes Braem & Sutton-Spence, 2001). Aim of this study is to compare in a narrative context the range of representational techniques and of highly iconic structures we might observe in co-speech gestures, produced by 10 hearing speakers, with those observed in sign language, produced by 10 deaf signing people. Both adults and children (hearing and deaf) have been asked to watch an extract of a wordless cartoon, taken from the series “Tom and Jerry” and to retell the story depicted (constrained narrative). Narratives were videotaped for later analysis. A common procedure to transcribe, annotate and code, spoken, signed and gestural data relying on Elan software, has been defined and used. Gestures and signs produced by hearing/deaf children and adults were coded according to representational technique used to analyze co-speech gestures (Capirci et al., 2011; Marentette et al., 2015): hand-as-object (i.e. the hand acts as the object itself); hand-as-hand (i.e. the hand acts as a hand); size-and-shape (i.e. hand/s depicted the size or shape of an object); own-body (i.e. the narrator identifies as the character and acts out an event). Gestures and signs were then coded according to the same typology of highly iconic structures used to analyze sign languages (Cuxac & Sallandre 2007): Personal Transfer (i.e. the signer ‘becomes’ the entity to which s/he refers); Transfer of Size and Shape (i.e. the object is described by means of handshake -proforms); Situational Transfers (i.e. involve the movement of an object or character relative to a stable locative point of reference); Double Transfer (i.e. combining different types of transfers). Results showing interesting equivalences across the two taxonomies of analysis, provide a unified methodology to analyze gestures and signs and give scholars the possibility of investigating the similarities between the principles on which their representation of reality and the internal structure of their units are based.

Keywords: taxonomies, highly iconic structures, representational technique, narrative, co, speech gesture, sign language

# English speakers and ASL signers extend the metaphor MORE IS UP to subset/superset relationships for quantification

Allison Durkin <sup>1</sup>, Deanna Gagne <sup>2</sup>, Kathryn Davidson <sup>3</sup>

<sup>1</sup>Yale University [New Haven] – 157 Church Street, New Haven, CT 06510-2100, United States <sup>2</sup>University of Connecticut (University of Connecticut) – 44 Weaver Road, Unit 5233, Storrs, CT 06269-5233, USA, United States <sup>3</sup>Harvard University [Cambridge] – Massachusetts Hall Cambridge, MA 02138, United States

Metaphors involving the spatial ordering of concepts have long been a target of research in both gesture and sign languages. In sign languages, the focus has been on individual signs and regularities within groups of signs that show ties to existing cultural metaphors, such as the American Sign Language (ASL) sign INCREASE, which uses an upward motion consistent with the metaphor MORE IS UP. This study focuses on the gestural origins of a more abstract metaphoric representation of MORE IS UP in ASL: emerging research shows that ASL uses height simultaneously with quantifiers and pronouns to illustrate a subset/superset relationship via an extension of the metaphor MORE IS UP: for example, NONE or ALL signed higher in ASL applies to more people (i.e. a larger set/ semantic domain) than if signed lower (i.e., a smaller set/ semantic domain) (Davidson & Gagne, 2014). In the present study we ask whether English speakers who share the basic MORE IS UP metaphor in spoken language (Lakoff & Johnson, 1980; Langston, 2002; Sell & Kaschak, 2012) and gesture (Winter, Perlman & Matlock, 2013) extend it to subset-superset relationships in order to understand whether more grammatical uses of space (here, quantifier domain restriction) are confined to fully formed sign language or are already present in non-signers' gestures. Our participants were 4 native English speakers with no previous exposure to a sign language. Each was presented with 13 prompts (8 test stimuli designed to elicit gestures for subsets and supersets, 5 fillers). Each test prompt involved a quantifier (e.g. someone, no one, everyone) in a short story (between 1-8 sentences, 1-6 occurrences of quantifiers each). Participants were first asked to read, then tell the story from memory, and then to pantomime ("silent gesture") the story to another English speaker. After pantomiming, they were asked to repeat the story using "whatever combination of words and gestures" they liked, to elicit more abundant co-speech gesture. Analysis of both pantomime and co-speech gestures was performed. Each gesture referring to quantification was coded for increase or decrease in height and/or width relative to the participant's most recent quantificational gesture. Results indicate that changes in height for corresponding changes in set sizes were demonstrated by every participant of this study, suggesting that the intuition is indeed robust across multiple English speakers. This supports the hypothesis that English speaking non-signers extend the metaphor of MORE IS UP beyond the mapping of the vertical axis on a single number line (e.g. rising stock prices or lowering temperature) toward a further abstract subset-superset relationship, as in a full sign language. We will discuss future directions of this work, which include an online comprehension experiment (in progress) and cross-cultural elicitations (in Nicaragua and Japan).

Keywords: Metaphor, Vertical space, gesture, American Sign Language, Grammaticization

# Neurophysiological correlates of frequency and iconicity in American Sign Language

Karen Emmmorey, Zed Sevcikova Sehyr, Katherine Midgley, Phil Holcomb

San Diego State University (SDSU) – United States

Event-related potentials (ERPs) were used to investigate the neural dynamics of single sign recognition, identifying electrophysiological components associated with lexical frequency and iconicity. The study capitalizes on a database of 1000 signs rated for frequency and iconicity. We recorded ERPs from deaf signers (N = 38) and hearing nonsigners (N = 22) while they watched video clips of 400 ASL signs. Deaf signers performed a semantic categorization task, monitoring for rare signs (10% of trials) that referred to persons (e.g., DOCTOR, GIRL). Hearing nonsigners monitored for a rare repeated sign (10% of trials). The results indicate a clear effect of frequency for deaf signers. Low frequency signs produced a more negative ERP response compared to high frequency signs, starting 100-200 ms after sign onset with a broad distribution across the scalp. This frequency effect was not observed for hearing nonsigners. The polarity and time course of the ASL frequency effect parallels what has been observed for spoken words, indicating that the neural response to lexical frequency is independent of language modality. For deaf signers, highly iconic signs elicited a more negative response that was right lateralized over frontal sites, starting 300-400 ms after sign onset. For hearing non-signers, iconicity did not modulate neural responses at frontal sites. For both groups, iconic signs elicited a more negative response at posterior sites, although this response began later for hearing nonsigners. These data are beginning to suggest a distinct neural signature for iconic signs, which is different for signers and non-signers.

Keywords: ASL, ERPs, Iconicity

## Emergence of Syntactic Cues in a Young Village Sign Language

Rabia Ergin, Irit Meir , Deniz Ilkbasaran , Ariel Cohen-Goldberg , Naomi Caselli , Carol Padden , Ray Jackendoff

Tufts University – United States

Central Taurus Sign Language (CTSL) is a village sign language that emerged naturally because of recessive deafness in an isolated mountainous area in Southern Turkey. This language developed with little or no influence from Turkish Sign Language (TID) and is distinct from it, as evaluated by a deaf native TID signer. CTSL is used in three tiny villages –villages D, K and T– involving a deaf population of 4.8%, .6% and .5%, respectively. It is important to study the emergence of structural cues in CTSL because, like 12 other village sign languages that have been reported so far (Zeshan & de Vos, 2012), it provides yet another situated vantage point about how language develops in the absence of an accessible language model. We compared the linguistic behaviors of two deaf sisters from village D. The two sisters, ten years apart, were born into different linguistic environments. YS had more interlocutors and more sophisticated language input as more deaf members were born into the community before she was born.

The data, collected through a controlled elicitation task and spontaneous conversations, reveal differences in the way these two sisters use syntactic cues in communicating their messages. In the controlled elicitation task, signers viewed 30 short clips that involve intransitive, transitive, and ditransitive events (Sandler, Meir, Padden & Aronoff, 2005), which they described to a deaf or hearing CTSL signer who then identified a matching image. OS and YS successfully communicated the event 56.6% and 80% of the time, respectively. Interestingly, OS omitted syntactic arguments in 23.3% of her utterances while YS's omission rate was only 3.3% . An extract of 300 signs was analyzed from each sister's spontaneous conversations. The results reveal that one-word utterances comprised 49.4% and 26.4% of OS's and YS's signing, respectively and that they produced an average of 1.7 and 2.3 signs per prosodic unit, respectively.

All together, we find that YS's utterances are syntactically more complete and complex than those of OS. YS utilizes prosodic contours as an extra-syntactic cue to indicate which signs are functionally related to each other and 'packs' more lexical information per prosodic unit. OS, on the other hand, utilizes proportionately shorter units that, while semantically related, come in linear order without clear structural cues.

Our results suggest that the systematicity and complexity of syntactic grammars can increase in a relatively short time-span. Jackendoff and Wittenberg (2014) suggest a hierarchy of grammatical complexity ("one-word", "two-word" and "concatenation" grammars) that accounts for how meaning is conveyed in syntactically less-developed systems. Consistent with their proposal, our results suggest the differences between the grammar of OS and YS can be characterized as two stages on the hierarchy: "one-word" (OS) and "two-word" (YS) grammars.

Keywords: Central Taurus Sign Language, village sign language, the hierarchy of grammatical complexity

# The effects of L1 on teacher's use of gesture in foreign language classroom.

Farbod Farahandouz

Institut National des Langues et Civilisations Orientales (INALCO) – INALCO – 2 rue de Lille 75007 Paris, France

Gesture as a component of interaction has an influential role in language learning and teaching specially in language classroom. Despite the importance of this role in communication, it seems that, this aspect of interaction in learning situation is marginalized and not enough explored. Teachers use communicative strategies to convey meaning and linguistics knowledge in foreign language for example gesture as a communicative strategy is largely used when there is a lexical difficulty or when the teacher thinks gesture can facilitate his task of transmission. Learners also use gesture as a strategy to communicate in learning situation and I when they are talking to native speakers (Gullberg, 1998). Some important functions attributed to gesture in language classroom are: gesture to animate, gesture to evaluate and finally gesture to inform (Tellier, 2008a). In addition gesture works as a mnemonics for vocabulary learning (Tellier, 2008b) and also a means for teaching culture and communication in L2.

This research tries to compare the effects of L1 and L1 culture on the gesture of two teachers who teach French as a foreign language. One teacher who is the native speaker of French and the other who is the native speaker of Persian.

Keywords: Language teaching, teacher's gesture, L1, culture

# Perspective and coherence as a multimodal affair: Eye gaze and body orientation in the depiction of locations and spatial relations by fluent and L2 signers of Norwegian Sign Language

Lindsay Ferrara, Anna-Lena Nilsson

Norwegian University of Science and Technology - NTNU (NORWAY) (NTNU) – NO-7491 Trondheim, Norway

Interaction is a multimodal activity, as people coordinate their hands, body, facial expressions, and eye gaze to communicate with each other. For example, during instances of reenactment, a type of depiction, both speakers and signers often indicate perspective using their eye gaze and body, contributing to the coherence of this type of action (e.g., Sidnell, 2006; Ahlgren & Bergman, 1994, albeit using different terminology). The current study looks at this type of multimodal coordination and its contribution to coherence in another type of activity-the description of locations and directions-as produced by deaf signers and hearing L2 learners of Norwegian Sign Language. A previous study showed that while students were often able to produce signs that depict locations and spatial relations, they still struggled to produce texts that made sense (Nilsson & Ferrara, 2015). This study expands on this previous work by first examining how deaf signers coordinate eye gaze and body orientation with signs to establish perspective and promote coherence. These findings are then compared to what a group of L2 learners do.

Data for this study includes video-recordings of hearing college students, who are intermediate learners of Norwegian Sign Language, giving directions to and from various places and describing where places and things are located. Three of their deaf instructors were asked to complete the same tasks. The recordings were then annotated in ELAN for fully, partly, and non-lexical signs. Next, instances where the students and instructors provide scaled-down depictions of locations or spatial relationships through the use of depicting signs, which are iconic, partly-lexicalized signs (Liddell, 2003), were identified. These sequences were then annotated for gaze direction and body orientation (e.g., towards interlocuter, towards hands, etc.).

Findings show that the deaf instructors coordinate their eye gaze, body movements, and signs to provide a perspective with which to view a depiction. For example, one signer consistently watches his hands as he describes driving through a city to reach a destination. In addition, the orientation of his body and eyes to his hands indicate from which direction this depicted journey should be viewed, which contributes to the coherence of the text. Students, however, were found to struggle with this type of coordination. For example, they very rarely watched or orientated their bodies towards their own depictions. The result, we suggest, is insufficient information with which the interlocuter (and even the signer) can relate to and interpret the depicted scene. These findings have implications for both multimodal communication and (hearing) L2 signed language acquisition.

Keywords: second language acquisition, multimodality, space and viewpoint, sign languages



# The compositional meaning of stances in the tai chi solo form

Gaelle Ferre

Laboratoire de Linguistique de Nantes (LLING) – University of Nantes – France

Unlike other martial arts tai chi is practiced alone and the solo form resembles more some choreography than actual wrestling. The form is structured in three sections, each of which is bounded with an opening movement of the arms at the beginning, and a closing movement at the end, both movements giving some unity to each part. The form counts over 100 stances in total, linked together with transitory movements, and the whole form may be performed in different styles which either symbolize one of the five elements (water, earth, wind, wood, metal), or imitates the movements of an animal (monkey, snake, bear) with more or less rigidity of the body and fluidity of the stances (Hine, 1992; Pawlett, 2010). Many of the stances are composed of several actions which are reanalyzed as forming a single figure, and will be our object of study. For example, the stance called White crane spreads its wing (represented in the figure provided in the pdf file) is composed of three actions performed simultaneously: the right arm is raised to the right side of the body, slightly above the head, fingers extended, to ward off any potential blow to the head from an assailant. At the same time, the left arm is lowered and extended to the left, palm downwards, to parry any potential side kick from another assailant, and the left leg, bended at the knee, is raised as in preparation of a kick to an attacker located in front of one's body. The stance then figures two defensive actions and an offensive one, although assailants are not physically present and are only represented by each movement. Taken together, these three actions are resemiotized into a single iconic shape (McNeill, 1992, 2005). "Resemiotization is about how meaning making shifts from context to context, from practice to practice, or from one stage of a practice to the next" (Iedema, 2003:41). In the stance, the extended arms depict the extended wings of a bird while the lifted leg pictures a long-legged species of bird that typically stands on one leg when on the ground. This iconic shape takes a new symbolic meaning: in Chinese mythology (Roberts, 2004), the crane is a symbol of longevity and cranes have traditionally been believed to fly souls to heaven. The bird is therefore strongly associated with death in the Chinese folklore and white being the color of mourning in this culture, we now see the new symbolic meaning assumed by the stance as a link between the earth (represented by the foot on the ground) and heaven (with a direct association between heaven and sky, represented with the hand above the head).

Keywords: compositionality, resemiotisation, tai chi solo form, stances

# Multimodal Marking of Obviousness in German and Dutch: A Contrastive Study

Kurt Feyaerts, Steven Schoonjans, Geert Broûne , Katinka Mangelschots, Annelies Jehoul

University of Leuven – Belgium

Multimodal Marking of Obviousness in German and Dutch: A Contrastive Study Jeshion (2001: 955) defines the notion of obviousness'as follows: "Proposition p is obvious to agent A at time t if and only if solely in virtue of grasping p at t, p seems to be true to A." Paraphrasing this definition, we can say that utterances of subjective obviousness express a speaker's intersubjectively coordinated stance of experiencing a certain state of affairs as obvious. Putting it somewhat bluntly, obviousness is the quality of being easily understood and not being in need of further arguments or proofs.

In both Dutch and German (as in many other languages), there are different ways of marking the obviousness of a claim. These include verbal markers (e.g. the discourse particle ja and adverbs such as natuurlijk/nat'urlich 'naturally') and morphosyntactic structures such as the aposiopesis. Previous work (e.g. Schoonjans 2014 on German) has shown that gestures also play a role in the marking of obviousness, and that they may do so both in combination with a verbal marker and when they are used on their own.

In this presentation, we bring together first results of empirical studies on the multimodal marking of obviousness in Dutch (Jehoul 2014) and German (Mangelschots 2015), in order to contrast the verbal and kinesic means used to mark obviousness, looking both at the individual elements and their co-occurrence patterns. Although the data set may benefit from further elaboration, the first results already hint at some interesting similarities and dissimilarities between both languages, which will be the main focus of this talk. In this discussion, external factors that may influence the distribution of the (verbal and non-verbal) markers, such as setting and discourse type, will be taken into account in order to see to what extent they may have played a role. Despite the resemblances between both languages and despite the fact that some of the differences may be related to these external factors, the data thus offer new support for the assumption made by Müller (1998:231), among others, that gestures are language-specific.

## References

Jehoul, Annelies. 2014. Multimodale uitdrukkingen van 'vanzelfsprekendheid'. Een empirische corpusstudie. MA. thesis, Dept. of Linguistics KU Leuven.

Jeshion, R. 2001. "Frege's notions of self-evidence." *Mind*, 110.440, 937-976.

Mangelschots, Katinka. 2015. Multimodale Evidenzmarkierung Eine kontrastive Analyse Deutsch – Niederl'andisch. MA. thesis, Dept. of Linguistics KU Leuven.

Müller, Cornelia. 1998. Redebegleitende Gesten. Kulturgeschichte – Theorie – Sprachvergleich. Berlin: Berlin Verlag Arno Spitz. Schoonjans, Steven. 2014. Modalpartikeln als multimodale Konstruktionen. Eine korpus- basierte Kookkurrenzanalyse von Modalpartikeln und Gestik im Deutschen. PhD dissertation, KU Leuven.

Keywords: stance, taking, multimodality, co, speech gestures

# Gesture Use by Preschoolers during Early Arithmetic Problem Solving

Lori Foran, Brenda Beverly

University of South Alabama – United States

Gesturing supports accuracy in mathematics including counting and solving equations (Alibali & DiRusso, 1999; Carlson, Avraamides, Cary, & Strasberg, 2007; Golden-Meadow, Cook, & Mitchell, 2009) and increasingly educational methods emphasize students' explanations for their solutions, a language-loaded task. Forty-one preschool children (mean age = 62 months) from one school in the southern U.S. participated. Children solved and explained solutions to word problems that included picture stimuli under two repeated conditions. In the Gesture- Encouraged condition, use of hands and fingers as children solved and explained their solutions for six word problems was promoted. In the Gesture-Prohibited condition, children kept their hands still as they solved and explained their solutions to six additional word problems. Accuracy differences between conditions were nonsignificant. However, counting evidence, such as head nodding during the Gesture-Prohibited condition, was prevalent and predicted accuracy in both conditions: Gesture-Encouraged,  $F(1, 39) = 9.85$ ,  $p = .003$ , and Gesture-Prohibited,  $F(1, 39) = 25.01$ ,  $p < .001$ . This likely obscured an effect of experimental condition. During the Gesture-Encouraged condition, children produced 871 gestures averaging 21 gestures ( $SD = 19.94$ ) across the six problems. Children who solved word problems more accurately produced a larger proportion of gesture types that supported counting, a critical strategy for addition. Counting gesture types included pointing and various use of cardinal gestures. Interestingly, children expressed significantly more mathematic solving strategies, both effective and ineffective strategies, when gesture was encouraged than when prohibited; although, there was no significant difference in the number of effective strategies between conditions. Gesturing seemed to elicit rich thinking that activated both effective and ineffective strategies.

Due to sex differences in mathematic performance of school-aged individuals (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006) and in language and gesture development of young children (Özcaliskan & Goldin-Meadow, 2010), accuracy between sexes was compared revealing performance differences. Boys ( $N = 22$ ) significantly outperformed girls ( $N = 19$ ) when solving mathematic word problems in the Gesture-Prohibited condition,  $t(39) = 2.67$ ,  $p = .01$ ,  $d = .86$ , and on a baseline math task,  $t(39) = 3.15$ ,  $p = .003$ ,  $d = 1.00$ . Yet, there was no significant difference between sexes when gesture was encouraged,  $t(39) = 1.78$ ,  $p = .08$ . The act of gesturing appeared to close the performance gap between boys and girls. Additionally, assessed language skills will be reported.

Gesture use appeared to aid the solving accuracy of children whose skills in mathematic solving were in a state of development. Preschoolers whose math and language skills are less advanced than peers may profit from spontaneously gesturing and explicit instruction on implementing gestures that support counting as they learn how to combine sets of items to determine sums.

Keywords: Gesture, Mathematics Education, Sex Differences

# From Here and Now to There and Then: Parent and Child Gesture Use During Narrative and Pretend

Rebecca Frausel, Amanda Brown, Lindsey Richland, Susan Levine, Susan Goldin-Meadow

University of Chicago – United States

Much research has examined differences between contextualized ("here-and-now") and decontextualized ("then-and-there") speech among parents and children. While most parent-child talk is situated in the here-and-now (Cummins, 1984), previous research has demonstrated that parental use of decontextualized language, such as narrative (language used to recount stories of personal experience about the past or future, fantasies, or hypothetical events) and pretend (language used during pretend episodes of interaction including making an object represent another; attributing actions, thoughts, or feelings to inanimate objects; and assuming a role or persona) is implicated in children's later academic success (Katz, 2001; Beals, 2001; Demir et al, 2010). Whereas narrative speech is decontextualized because it describes "then-and-there" events of the past or future, pretend speech is often concerned with events in the current context, though the details of the current context are replaced with abstract or symbolic ones (e.g. using a banana as a phone).

In addition, the gestures that accompany language used by both parents and children have been shown to predict changes in children's speech during transitional periods of development (Goldin-Meadow, 2003; McNeill, 1992). Children's language outcomes are also impacted by parents' gesture use early in development (Rowe & Goldin-Meadow, 2009).

Though the emergence of gesture has been described across development more broadly, the developmental trajectory of gesture during decontextualized speech remains largely unexplored. As different types of decontextualized interactions, narrative and pretend speech may provide insight into the differences in gesture patterns that occur during these early exchanges and their potential impact on later educational outcomes.

We examined rates of gesture use in 18 parent-child dyads (10 girls; 17 mothers) during 90-minute spontaneous interactions across three time periods in the child's life: 18-, 38-, and 58-months. Speech was transcribed and divided into utterances (any sequence of words preceded or followed by a pause, change in intonational pattern, or change in speaker). Utterances were then coded for presence of co-speech gestures (defined as a nonverbal communicative act) as well as context (narrative and pretend, with all other speech defined as "contextualized"). Results demonstrate that while almost all parents and children use gestures with contextualized speech across all time points, gesture use with decontextualized speech was less frequent. In addition, while most parents use gesture to accompany their narrative utterances at similar rates to gesture used with contextualized speech, children incorporate gestures more frequently with pretend speech. This might reflect differences in how tied to reality these different types of decontextualized speech must be: before truly being able to gesture about the "there and then" in narrative speech, children first gesture with pretend speech, which exists in a liminal space between the "there and then" and the "here and now."

Keywords: pretend, narrative, co, speech gestures, parental input, decontextualized speech

# Mental Reorganization in the Domain of Placement Events: A View from the Gestures of Second Language Learners of American Sign Language (ASL)

Anne Therese Frederiksen

University of California, San Diego (UCSD) – United States

Learning to express placement events in a target-like manner has been demonstrated to cause difficulty for second language learners whose first language uses a typologically different way of talking about placement than their second language. Evidence from gesture patterns has shown that the mental reorganization of this domain to align with the L2 system may be incomplete, despite target-like speech (Gullberg, 2009). This paper reports on preliminary results of a study asking how learning an L2 in a different modality affects the expression of placement events. We analyzed speech, sign and gestural expressions of placement from two native ASL signers, four intermediate L2 ASL signers (in ASL and English), and four native English speakers, collected using a director-matcher task (Adapted from Gullberg, 2009). We expected English speakers to use general caused motion verbs, and to gesture about path more often than about the figure object (Hoetjes, 2008; Gullberg, 2009). We expected the native ASL signers to use the sign PUT, modified with handling classifiers indicating the figure object. For the L2 signers, we had two hypotheses. First, we expected that they would incorporate less object information in their ASL descriptions than the native signers, owing to incomplete system reorganization. Second, because ASL is a language that requires attention to the figure object and because work on Japanese-English L2 speakers has shown that gesture is a prime locus for bidirectional language transfer (Brown & Gullberg, 2008), we expected the learners to gesture more about the object in English than their non-signing counterparts.

The results confirmed our hypotheses. In speech, English speakers with and without ASL knowledge preferred the general caused motion verb put. The native ASL signers primarily used the verb PUT in their descriptions, generally incorporating figure-handling handshapes. The L2 signers, however, tended to use the citation form of PUT, leaving out information about the figure object. In contrast, the gesture results show that while three out of four English speakers gestured more about path than about the figure object, three out of four L2 ASL learners gestured more or equally often about the figure object than they did about path.

We speculate that the gesture patterns we observed in the learners are evidence of ongoing mental reorganization in the domain of placement events. Previous work has suggested that L1 gesture is particularly likely to be affected by exposure to a signed L2 (Casey, Emmorey & Larrabee, 2012). This, and the fact that ASL is expressed through only one channel, may account for why we see the change in L1 gesture, rather than in the L2 itself.

<sup>i</sup> We use the abbreviation L2 for second language ; <sup>ii</sup> Gullberg, 2009 ; <sup>iii</sup> Adapted from Gullberg, 2009 ; <sup>iv</sup> Hoetjes, 2008; Gullberg, 2009 ; <sup>v</sup> Brown & Gullberg, 2008 ; <sup>vi</sup> Casey, Emmorey & Larrabee, 2012

Keywords: cross modal language learning, bidirectional language influences, co speech gesture, American Sign Language, second language learning, placement events

# How gestures tune meaning of multimodal utterances: Analyses of modifying functions

Farina Freigang, Stefan Kopp

CITEC, Bielefeld University (CITEC) – Social Cognitive Systems Group CITEC - Center of Excellence in "Cognitive Interaction Technology" Bielefeld University PO-Box 10 01 31 33501 Bielefeld, Germany

In natural communication, the propositional content of the verbal utterance is usually seen as the main part of what is intended to be communicated. However, utterance givers - in addition - may convey information about their viewpoint, certainty, conviction or attitude. This 'analogue' information is not only communicated via speech, but by means of other non-verbal modalities like gesture and body movements, since "the non-verbal phenomena [...] affect the way the utterance is understood" (Wharton, 2009, p. 12).

We assume that gestures can contribute to the meaning of an utterance not only by adding semantic information, but also by modifying verbally or gesturally signified content. In line with Kendon's (2004) and Payrato and Tessendorf's (2014) modal pragmatic function, we define a modifying function of gesture to act upon and to carry meaning beyond mere propositional content. These functions are not as clearly signified, but are nevertheless communicatively efficient and significant for how recipients interpret the multimodal utterance as a whole.

As a basis for our empirical analyses, we conducted a rating study in which participants had to rate 36 video snippets of natural utterances, comprising speech along with interactive (i.e., clearly not representational) gestures. Ratings were done in terms of 14 adjectives selected to be intuitively understandable and to correspond to the range of possible combined meanings that can be mapped onto our classes of modifying functions. We explored the rating data by means of a cluster analysis (Freigang & Kopp, 2015) and a factor analysis (Freigang & Kopp, still in prep.), in order to gain insights from different angles. The results from both analyses revealed a comprehensive picture of the dimensions of this meta-communicative behaviour and yielded three distinct groups of modifying functions: (1) the positive focusing or highlighting function, (2) the negative focusing or de-emphasising or downtoning function and (3) the negative epistemic ('I don't know') function. The results further implied a pattern between the functions and the forms of the gestures. Comparing the multimodal (speech and gesture) and the gesture-only condition (with cropped head of the speaker) gave insights into which elements of communication are conveyed by which modality. The negative focusing function, e.g., contains attitudinal tones in speech, which cannot be conveyed by gestures.

To further elucidate the perceived modifying functions, we conduct a rating study of artificially recombined audio and video material from different functions. One goal is to validate the functions and thus to get a clearer taxonomy. The second goal is to investigate whether modifying functions of gestures are (context-)independent of the co-occurring semantic utterance in order to clarify the autonomous contribution of speech and gesture to the overall pragmatic interpretation of a multimodal utterance.

Keywords: gesture, body movements, modifying function, natural interaction, multimodal corpus, empirical approach, cluster analysis, factor analysis, recombination study



# Iconicity in Signed motherese

Orit Fuks

Kaye College – Be'er Sheva, Israel, Israel

The aim of the study is to describe certain iconic depicting actions that deaf mothers use in communication in order to ease their hearing babies' signifier-signified mapping in early stages of signed language acquisition. Hearing parents tend to unknowingly use several 'gestural' strategies to draw their child's attention and to illuminate form-meaning connections in the early stages of language acquisition. Papousek & Papousek (1987) named this tendency intuitive parental. Parents tend to simplify the linguistic input directed at the child; they use relatively short utterances, slow speech articulation and exaggerated intonation. Pointing gestures are also known in literature as an important tool used by parents to focus the child's attention and for referencing (Rader & Zukow-Goldring, 2010).

Deaf parents also intuitively use a variety of 'gestural' actions to achieve joint attention and to facilitate their babies' word learning. Deaf parents tend to address short utterances to their babies during communication - articulating larger forms with many pauses in between. They also displace form articulation from their lexically specified location to a setting close to the object for referencing (Mohay, 2000).

And yet, despite the extensive research on signed motherese, on the one hand, and the prevalence of iconic forms in signed languages on the other, very few studies have investigated whether iconicity plays a role in deaf parents' "baby talk", that is, if deaf parents exploit form iconicity to enhance the transparency of signifier-signified connections.

The current longitudinal case study followed two hearing children's bimodal bilingual acquisition of ISL and Hebrew from the age of 8 to 40 months. The two children were videotaped at their home every two weeks for 30 minutes each time while interacting freely with their parents. In the current study we analyze the enhancement of depicting actions that the deaf mothers employed during communication with their hearing babies.

The results show that the deaf mothers frequently employed iconic depicting actions to promote their babies' structure-meaning mapping: they articulated mimetic vocal and corporal actions simultaneously to form production and also modified the formational structure of the forms to enhance the iconicity of the lexical items. Interestingly, they additionally used to point toward specific visual features of a referent, which is represented iconically by the lexical item before or after signing the form in order to illustrate to their babies the similarities between the structural features of the signifier and the visual features of the relevant signified.

Given the fact that most of the infants' first lexical items were highly iconic, the study's results manifest the importance of examining caregiver's enhancements of communicative behaviors during interactions with babies who are in the early stages of signed language acquisition

Keywords: Iconicity, Gesture, Motherese: Signed language

## Maternal responsiveness to infant pointing predicts later pointing frequency

Ebru Ger<sup>1</sup>, Nazli Altinok<sup>2</sup>, Ulf Liszkowski<sup>3</sup>, Aylin Küntay<sup>1</sup>

<sup>1</sup>Koç University – Istanbul, Turkey <sup>2</sup>Central European University (CEU) – CEU, Budapest, Hungary <sup>3</sup>Hamburg University – Hamburg University, Hamburg, Germany

Before the emergence of language, infants mostly communicate through gestures (Iverson & Goldin-Meadow, 2005). Pointing serves as one of the most prominent gesture and pointing frequency predicts language development (see Colonnese, Stams, Koster, & Nool, 2010 for a meta-analysis). However, predictors of the frequency of pointing has not been as widely investigated. A recent study showed that in infants aged 9 to 11 months, socialization processes such as imitation and adult shaping was the main determinant of pointing frequency in comparison to infants' own socio-cognitive abilities that rather appeared as the determinant of the onset of index-finger pointing (Matthews, Behne, Lieven, & Tomasello, 2012). Here we provide evidence for the prevailing effect of sensitive maternal responsiveness as a socialization process on pointing frequency compared to infants' own fine motor and socio-cognitive abilities. In this study, 35 mother-infant dyads were examined at 10 and 12 months of age. Infants who were not yet pointers at 10 months (N=4) and who were pointers but did not point at all at 10 months (N= 6) were excluded since maternal responses that followed infants' pointings were of interest (One additional infant was excluded due to missing fine motor score at 10 months). A final of 24 mother-infant dyads (12 girls, 12 boys) were included in the analyses. Infants' pointings (both index and hand) and their mothers' responses to these pointings were assessed via the decorated room paradigm (Liszkowski et al., 2012). Maternal responsiveness was based on mothers' verbal and/or non-verbal responses to their infants' points and was categorized as sensitive if those responses to infants' points were semantically relevant to the item infant pointed at (e.g. naming and/or pointing at that item), non-sensitive if they were irrelevant to the referent of the point (e.g. commenting on and/or approaching some other item), and nonresponsive if the mother did not provide any behavior. Percentages of these maternal responsiveness categories were calculated by dividing the total number of responses in each category by the total number of points. Additionally, infants' fine motor development and ability to follow points were assessed via the Mullen Scales of Early Learning (Mullen, 1995) and a point following procedure adapted from Mundy (2003), respectively. Results showed that the percentage of sensitive maternal responsiveness at 10 months significantly predicted the frequency of infants' points at 12 months, when controlling for the frequency of infants' points, Mullen scores, and point following scores at 10 months ( $F(4,19)= 5.069, p < .01, R^2=.52$ ). This study demonstrates the importance of socialization by maternal responsiveness on frequency of infant pointing above and beyond infants' socio-cognitive and motor abilities. Sensitive maternal responsiveness of infants' points lead to more frequent pointing at subsequent age points.

Keywords: infant pointing, maternal responsiveness, pointing frequency

# Gestural, multimodal, performative mathematics teaching for blind and visually-impaired learners (and their sighted classmates)

Susan Gerofsky

Dept. of Curriculum and Pedagogy, University of British Columbia (UBC) – 2125 Main Mall, Vancouver, BC, Canada. V6T 1Z4, Canada

Mathematics teaching typically uses visual representations as a primary modality for working with many key mathematical concepts. Graphs and diagrams are central to exploring ideas in secondary and post-secondary mathematics courses. However, not all students learn well from representations that are solely visual – and those with blindness or severe visual impairment are simply unable to access graphs and diagrams presented visually. How, then, could multimodal representations be used in mathematics pedagogy to help both visually impaired students and their sighted classmates learn about mathematical patterns and relationships? More particularly, how could embodied modalities of gesture, movement, vocalized sounds and performance offer non-visual representations to help students learn about mathematical functions and their graphs?

Over the past nine years, the researcher and co-investigators have been working with mathematics learners in elementary and secondary schools (aged 10-19 years) to theorize, develop and test new multimodal, gestural and performative pedagogies in mathematics, working with learners characterized as gifted, 'average', reluctant, dyslexic, and most recently, those with visual impairment or blindness, in schools in Canada and Italy. The author presented earlier findings at a previous ISGS conference and published in the journal *Gesture* and in edited volumes on gesture and multimodal learning, as well as in journals of mathematics education (Author 2007, 2010, 2011, 2012). Current research is based on the following research questions:

- (1) How might physical gesture, movement, vocal sounds and performative modalities be used by students with visual impairments for making sense of and expressing mathematical ideas?
- (2) How might research into multimodal, multisensory and performative ways of doing mathematics with blind learners lead to innovative pedagogies that benefit all learners?
- (3) How do new research findings in the gestural, multisensory, multimodal learning of mathematics advance theoretical constructs of embodied learning in mathematics?

This presentation will report on the findings from our qualitative, naturalistic, design-based educational research (Denzin & Lincoln, 2005; Patton, 2002; Lincoln & Guba, 1985) over the past two years, working with blind and visually impaired learners and their sighted classmates. We worked cooperatively with teachers and students in schools over the course of 6 months of the school year to carry out teaching experiments (Hunting, 1983; Thompson, 1982) based on our hypotheses drawn from the research literature on gesture, embodied ways of knowing and multisensory, multimodal mathematics learning (Healy & Fernandes, 2011; Arzarello & Robutti, 2008; Figueras & Arcavi, 2014). Students were interviewed individually and in small focus groups after a series of experimental lessons, and small-group pre- and post-tests, using a think-aloud protocol (Schoenfeld 1985) were used to assess mathematical understanding.

This research contributes to theorizing in gesture studies, embodied mathematics learning and critical disabilities studies, and develops innovative praxis in mathematics pedagogy and curriculum.

Keywords: mathematics, learning, teaching, multimodal, multisensory, performative, pedagogy, blind/

## Posters

visually, impaired, graphs



# Buildings and Gestures: Artwork Making Memory Material

Susan Giles

School of the Art Institute of Chicago (SAIC) – School of the Art Institute of Chicago, Department of Contemporary Practices, Sharp 318, 37 S. Wabash, Chicago, IL 60603, United States

I propose to present video artworks, a scale model, drawings, and plans of sculptures in progress that explore the role of gestures in memory of place at the 2016 ISGS conference. My videos record multiple speakers' gestures as they recall personal travel stories and describe specific landscapes, monuments, and architecture. In one video, participants describe famous world buildings they have visited, but the editing suggests a narrative of a single building. Shot in a blank room to emphasize the visual and spatial aspects of memory, the cuts include only the speech accompanied by gestures. My sculptures derive from similarly videotaped gestures, but are manifest as linear forms constructed to model the gestures in space. One piece uses the lines and shapes from multiple speakers' gestures to build an abstracted, mediated single form of the Arc de Triomphe. Both the videos and sculptures explore our collective desire to make memory physically tangible.

Through our travel photos and videos, our need to re-capture an idealized image of place merges our preconceived notions of the sight with experience of seeing first hand (Frow, 1991). This re-enactment has resulted in images so pervasive as to become generic. Consequently, we take a selfie in order to designate it as personal. The photo album is replaced by a social media archive where the selfie is completed with captions to shape the story we wish to project to the world.

Collecting souvenirs is another way to make the ephemeral experience of place tangible. The souvenir, however, is a metonym of place, lacking the mark of its owner, and in need of a supplementary narrative (Stewart, 1994). Retelling travel stories transforms our memories and provides a means to hold on to an experience that is increasingly distanced from us through the passing of time. The gestures our bodies enact through these narratives reconnect us to past experience by making that experience material for us in the moment of speaking (McNeill, 2005). Stewart's reflection on distance corresponds to McNeill's idea that gestures are more likely to be made when the speaker feels a gap between the thought and the "immediate context" (McNeill, 2005). Language becomes sculptural through gestures. Mittleberg (2014) investigated three-dimensional representations of gestures that give insight into particular characteristics of a speaker's childhood memory of a spiral staircase. Making memories of place into concrete, spatial forms is rich territory for artistic exploration. By physically constructing the moments of recalled experience through visual and material interpretations of gesture, I aim to provide the viewer with the opportunity to reflect on the way multiple individuals' memories are inscribed on the collective experience of public place.

Keywords: visual art

# Gesture in the theatre: Addressing issues with modern pedagogy by bridging empirical studies and theatrical training

Ellen Gillooly-Kress

Universit'e d'Oregon – University of Oregon Eugene, OR 97403-1302, United States

To theatre practitioners, the mention of "gesture" evokes many different traditions of theatre throughout history. From the intentional arm movements of Noh theatre to Brechtian "Gestus," the concentration of theatre practitioners has always been on intentional movement, that conveys meaning transcendent of what may be spoken on stage (Noland, 2008). The equivalent in gesture studies may be what Kendon refers to as "emblems" (Kendon, 1986). Finer grained distinctions of the role of gesture appears in physical theatre traditions, most notably the tradition of mime or clown from LeCoq in Paris (LeCoq, 1976). The focus in this tradition is on cultural memory of gesture, or how a person's context shapes their interactions with the world. In today's psychologically realistic or "method" acting, many practitioners have made the observation that inexperienced actors may not know what to do with their hands (Stanislavski, 1989). Referred to as the "hamburger hands" problem, the repetitive and clunky gesture that an actor may produce while reciting memorized material serves a possible distraction to performance. An answer to this issue may reside in empirical gestural studies, more specifically hypotheses that address the origin of gesture, like the Information Packaging Hypothesis posited by Alibali, Kita and Young (2000) or the simulated action framework for gesture posited by Hostetter and Alibabli (2010). These hypotheses posit that gesture arises from the conceptualization stage of language creation, a process that may be absent with inexperienced actors mechanically memorizing language. This particular type of research may be coupled with the research of Helga and Tony Noice (2001) on the embodied type of memorization by professional actors. These researchers maintain that experienced actors (who are often believed to be more natural or realistic) concentrate more on the meaning of the words to be memorized over the forms of the words themselves. What is being posited is that inexperienced or student actors may not be accessing the semantic or conceptual space that is coupled with certain kinds of natural or spontaneous gesture, resulting in strange or unnatural gesture. If this is true, then training of acting teachers may be supported by empirical research. Teachers are made aware of this kind of issue in memorization and perhaps may be able to train students in more effective ways of memorization that unlocks their true potential towards "natural acting." Training in cospeech gesture and the various ways it manifests may result in more successful or realistic performance, when addressing this issue of semantic access to memorized text. I connect the specific research of this current problem in acting training and pedagogy to issues being explored in gestural studies and posit further research needed in cooperation with both fields to address this issue.

Keywords: theatre, performance, gesture, pedagogy, cospeech gesture, memory



# Does emotional information conveyed by gestures and prosody facilitate irony detection?

Santiago González Fuente, Pilar Prieto

Universitat Pompeu Fabra (UPF) – Roc Boronat 138, 08013, Barcelona, Spain

This study aims to test the potential contribution of emotional prosody and gestures to the development of children's ability to detect a speaker's ironic intent. Development studies on irony comprehension have shown that appreciation of a speaker's intent requires the assessment and integration of cognitive and emotional information, and that this inference process becomes more accurate as children grow up (e.g. Harris & Pexman 2003, a.o.)

There is no consensus in the literature regarding the role of auditory cues in verbal irony detection by children, and, as far as we know, so far no studies have tested the role of gestures in verbal irony detection by children. The main aim of this investigation is to test whether gestural and prosodic cues will be used by children to detect the ironic intention of the speaker, and, moreover, whether they use more actively these cues than contextual ones to detect the ironic intention of the speaker.

Ninety 5- to 12-years old Catalan-dominant children (30 5-years old; 30 8-years old and 30 12-years old) participated in a perception experiment in which they were audiovisually presented with 12 short stories that involve two characters and end in a target statement. These 12 target statements were presented in 5 different conditions obtained from a combination of three variables: (1) context (positive vs. negative); (2) sentence evaluation (positive –e.g. 'That was so good'- vs. negative – e.g. 'That was so bad'-) and (3) conveyed emotion (positive vs. negative vs. emotionless). Children were asked to judge the speaker intent to be "nice" or "mean" through the selection of a response object: a "nice" duck or a "mean" shark (as in Nicholson et al. 2013). We assess (a) children's judgments of the speaker's intent to be mean or nice and (b) children's on-line processing of speaker intent (the time taken to judge the speaker's intent to be mean or nice through the selection of one of the response objects). As a control task, children complete an emotion detection task (i.e. Ruffman, 2002).

Results of both judgments of the speaker intent and children's on-line processing of speaker intent showed that contrasts between literal content of the statement and the way the sentence is produced (e.g. a positive sentence –'That was so good'- performed with a 'negative' or 'emotionless' expression) were crucially for irony recognition of 5-years and 8-years old children. On the other hand, 12-years old children detected irony independently of the emotion conveyed by the ironic remark. These results lead us to conclude that what seems to be important in early stages of verbal irony understanding development is the interaction between the emotion conveyed by prosody and gestures and the semantic content of the sentence, more than the context-sentence interaction.

Keywords: verbal irony, audiovisual prosody, pragmatics, emotions

# The interactional relevance of facial expressions in the production and perception of food assessments

Verónica González Temer

University of York [York] (UoY) – Heslington, York, YO10 5DD, United Kingdom

What are the interactional outcomes of the use of facial expressions (alone and in combination with verbal behaviour) in the production and perception of food assessments? I attempt to answer this by looking at how facial expressions are used in the context of assessing food from a multimodal perspective combining interactional linguistics and the study of embodied interaction. There is a vast literature for the study of assessments in interaction beginning with the work of Pomerantz (1975, 1978, 1984). With Charles Goodwin and Marjorie Harness Goodwin (Goodwin, 1984, 1986; Goodwin & Goodwin, 1987, 1992a, 1992b) as pioneers, more and more research in the area has paid special attention to multimodal analysis of other non-verbal behaviour involved in the production of assessments, such as eye gaze, head movements and facial expressions. Traditionally there has been an interest on the psychological and physiological aspects associated to facial expressions (Ekman, 2007; Ekman and Friesen, 2003). Nevertheless, attention is also being paid to the role of facial expressions in social communication and their relationship to linguistic context (Bavelas and Chovil, 1997, 2000; Ruusuvuori and Per'akyl'a, 2009).

The data for this research was obtained through an innovative experiment where six pairs of Chilean participants were audio and video recorded for twenty minutes as they sampled British foods unknown to them. They tried each food at the same time and discussed what they thought of it. Finally they came to a joint ranking of these products to produce sequences of agreement and disagreement as this data was gathered for a larger project on the role of gaze in the production of assessments.

I used a combined methodological approach including the sequential techniques of Conversation Analysis (CA) to identify assessments, their sequential location and their sequential positioning within the larger evaluative practice. I used the phonetic techniques of impressionistic observation and acoustic analysis to measure prosodic features. Finally I used the GAT2 (Selting et al. 2011) transcription system to capture the detail of talk-in-interaction, the temporal and sequential order as well as Lorenza Mondada's transcription conventions to show the multimodal details of embodied action.

The findings of this research will hopefully improve our understanding of language as multimodal, proving multiple channels (speech, gaze, gestures, movement) are produced conjointly for the sake of meaning. This and the management of sequence organisation contribute to the construction of meaning in a language that has not been subject to this kind of study and to the way some interactional practices work in different languages.

Keywords: facial expressions, facial gestures, assessments, food, conversation analysis, multimodality

# Eyebrows movements as a signal of misunderstanding

Aurélie Goujon

Aix-Marseille University (AMU) – Aix-Marseille Université - AMU – France

This study focuses on repair sequences initiated by the listener with a facial gesture (Bavelas et al, 2014), more precisely it analyzes listeners' eyebrows movements in conversation. As a joint action, conversation requires an important collaboration between participants (Clark, 1996). However, participants have to negotiate in order to succeed the interaction: they face misunderstanding moments, among other issues. Conversation Analysis describes these issues as "organization of repair, addressed to recurrent problems in speaking, hearing, understanding" (Schegloff et al, 1974). The potential problem can be signalled and solved thanks to several modalities, including but not restricted to verbal strategies.

The current work aims at analysing the emergence and the resolution of repair sequences according the verbal and gestural modality.

Gestural modality is here investigated through eyebrow movements, which constitute a specific kind of Conversational facial gestures, (context-dependent and speech-dependent gestures). Although studies focusing on eyebrows movements are scarce, it has been shown they are closely connected to speech (Cavé et al, 1996). Eyebrows movements are known to allow the interlocutor providing feedback signals for the speaker during the interaction (Allwood et al, 2003).

Data used in this study are part of the GTT corpus -Gesture in Teacher Talk (Tellier & Stam, 2012)- and consist in interactions between pairs of participants engaged in a lexical explanation task: one participant has to explain words to his/her partner to make him/her guess the words. This task elicits misunderstandings and repairs: For instance, when explaining "rapidement" (rapidly), the listener (B) shows misunderstanding with an eyebrows movement. Then, the main speaker (A) uses first the verbal modality to repair the interaction. Since this strategy is not successful, the speaker tries a second repair that included a gesture.

A: "C'est un adverbe"

it's an adverb

B: Haussement de sourcils + Coin de la bouche vers le bas

Raising eyebrow + Corner down of the mouth

A: "Euh ^etre press'é...Le fait de faire quelque chose de vite, aller vite..."

hum...be in a hurry...the fact of do something fast, to go fast...

B: Hochement de tête (de gauche `a droite)

nod (from left to right)

A: " Geste m'etaphorique + C'est une action, l'action de faire..."

Metaphoric gesture + It's an action, the action to do...

B: "Rapidement ?"

Rapidly ?

A: "Oui"

Yes

## Posters

This example shows that the speaker prefers repairing verbally in a first step, and then adding gesture in a second step - if necessary. Consequently, the verbal modality seems to appear before the gestural modality. Addressing this question, we will analyze 240 lexical sequences in order to determine whether this configuration (verbal modality preceding gestural modality) is always the one used by participants, or if they make use of other configurations.

Keywords: Eyebrows movements, Co, speech gestures, Repair, Multimodality

# Co-speech gestures and cognition in expressive aphasia

Camila Grigol<sup>1</sup>, Magda Bauer<sup>2</sup>, Lenisa Brandaño<sup>1</sup>

<sup>1</sup>Universidade Federal do Rio Grande do Sul (UFRGS) – Rua Ramiro Barcelos, 2777, Sala 314, Bairro Santa Cecilia - Anexo I da Saude, Brazil <sup>2</sup>Universidade Federal do Rio Grande do Sul - UFRGS (BRAZIL) (UFRGS) – Rua Ramiro Barcelos, 2777, Sala 314, Bairro Santa Cecilia - Anexo I da Saude, Brazil

We investigated the types of co-speech gestures which occurred during autobiographic narrative production of ten persons with predominantly expressive aphasia. Additionally, we were also interested in studying the extent to which attention and working memory play a role in the production of gestures by aphasics. Participants consisted in ten aphasics, classified as expressive aphasics, who suffered an ischemic vascular accident in the last 2 and a half years. Participants were mostly older adults (M=64.60; SD=11.86), with a medium of education of 8 years (SD=2.82). Patients with severe perceptual or cognitive deficits were excluded, as well as left-handed patients and patients with additional neurological diagnoses. Language measures from selected subtests of the Boston Diagnostic Aphasia Examination demonstrated that participants had relatively preserved comprehension skills, with high percentage of correct responses in the sentence comprehension (M=87.00; SD=20.57) and the short texts' comprehension subtests (M=83.75; SD=10.70). Language production measures demonstrated lower performance in the sentence repetition (M=60.00; SD=39.44), responsive naming (M=78.00; SD=20.97), and visual confrontation naming (M=82.56; SD=18.54) tasks. Cognitive evaluations were undertaken using NEUPSILIN-Af, which is a cognitive screening battery adapted for expressive aphasics. Participants had considerably better performances in the attention task (M=70.87; SD=19.33) than in the digit order (M=28.00; SD=13.16) and word span (M=31.42; SD=27.65) working memory tasks. None of the aphasics presented impairment of non speech manual praxic abilities. The event of meeting someone special was the topic of the discourse analyzed in this preliminary study. Video recordings of the conversations ranged from 9 to 10 minutes and analysis of the videos focused on the gestures produced. Discourse was analyzed by a Speech-Language Pathology student and 20% of the corpus was independently analyzed by two Speech-Language Pathologists obtaining 86% of agreement for inter-judge reliability. A variety of gestures described in the literature were found in the discourse of our aphasic participants. Gesticulation was the most common type of gesture produced, followed by space time, word finding, deictic, iconic, interactive and conventional gestures. In order to verify if the gestures of aphasics related to attention and working memory, we used the Pearson correlation test. The production of action iconic gestures correlated positively with attention scores (.59\*) and the expression of gesticulations correlated positively with working memory scores (.67\*). Pointing to something concrete in the communication context seemed to be easier for aphasics with lower semantic and attention resources, as we observed that the use of deictic gestures correlated negatively with both sentence comprehension (-.74\*\*) and attention (-.77\*\*) scores. Results are discussed according to the literature on the underpinnings of co-speech gestures and their production in aphasia. Additionally, we discuss the relevance of these findings for speech-language therapy programs designed to treat expressive aphasics.

Keywords: aphasia, co, speech gestures, attention, working memory

# Going to the oral production by gesture and multimodality: empirical educational experience in deaf children with neurodevelopmental disabilities in Ile-de-France (France)

Harold Andrés Guerrero L'opez <sup>1</sup>, Céline Faure <sup>2</sup>

<sup>1</sup> Centre Médical de Phoniatrie et de Surdit  Infantile L opold Bellan – MoDyCo UMR 7114 – France <sup>2</sup> Centre M dical de Phoniatrie et de Surdit  Infantile L opold Bellan – CMPSI L opold Bellan – France

Human communication principally integrates auditory and visual information (1). When auditory input is poor caused by a minimal hearing loss, visual information becomes priority and can eventually substitute it. Deaf children's brains develop more attention than those of hearing children to the visual environment in order to know about what is happening (2). However, when the child presents disorders of auditory (music, noise and speech), visual and kinesthetic sensory issues, this substantially has an impact on his communicative abilities and delays the acquisition of language. In order to design a rehabilitation program for this profile of population, a question come to us: how to approach and stimulate the communication of deaf children with cochlear implants/conventional aids and neurodevelopmental disabilities?

Visual input notably gestures from face and body segments of the speaker provide a better understanding of speech to deaf children (1,3). Gestures and bodily motion associated to the speech and other communicative supports make "visible" the sounds of speech. In this pilot experience, we have adopted that gesture encourages and/or upholds the production of oral emissions; it facilitates communication and development of language. Also, we have assumed that gesture is a "mimetic and analog format" in according to Goldin-Meadow (4). We have exploited non-conventional gestures or stereotypy of children. These gestures were repetitive and invariant movements that typically persisted in the absence of social consequences as defined by Rapp and Vollmer (5).

The purpose of this poster is to share outcomes of our educational practice using multimodality, notably the gesture and bodily motion as a mean to facilitate communication development and emergence of oral language in deaf children with neurodevelopmental disabilities. 10 children with severe to profound deafness of 5 to 14 years old participated in our rehabilitation program (5 cochlear implanted and 5 fitted with conventional aids). All children also had neurodevelopmental disabilities (Autism Spectrum Disorders or cerebral palsy). No child produced verbal language before. Rehabilitation program included educational activities using gestures, signs of French Sign Language, pictures, graphic and visual art as paint and design. Two groups were composed depending on their cognitive abilities. We were inspired by activities proposed by Verbo-Tonal method (6), Dynamique Naturelle de la Parole method (7) and musical activities for deaf people (8).

Our teaching approach was conducted by three steps in each session : I) child sensorially experiences one parameter of sound; II) he performs a gesture or movement of body which is instantly integrated to the listened sounds; III) child graphically represents the gesture or bodily motion. Later, this "visual mark" is used and recognized by the child to remind the realization of the gesture and oral emission associated. We have collected video and written records about these sessions of rehabilitation program.

Keywords: non, conventional, gesture, bodily motion, stereotypy, visual mark, graphic code, multimodality, oral production, speech, deaf children, neurodevelopmental disabilities, educational practice



# From movement to gesture: How the body reflects and enhances learning

Heather Harden Mangelsdorf<sup>1</sup>, Susan Goldin-Meadow<sup>2</sup>, Susan Wagner Cook<sup>3</sup>

<sup>1</sup> University of Chicago Department of Psychology – 5848 S. University Avenue, Chicago, IL 60637, United States <sup>2</sup> University of Chicago – United States <sup>3</sup> University of Iowa – United States

Children learn mathematics better when using their hands—whether spontaneously or when instructed to produce specific gestures (Broaders et al., 2007; Cook & Goldin-Meadow, 2006). Gesturing may facilitate learning by helping children extract meaningful information implicit in their hand movements (Goldin-Meadow, Cook & Mitchell, 2009). However, we do not understand how this information gets incorporated into conscious knowledge or why some children learn from gesture and some do not. A criticism of studies that manipulate how children move their hands is that the rote-like movements, although inspired from observations of what children spontaneously do when solving math problems, are not true gestures, since they are not direct representations of the child's thoughts.

The present study aimed to identify whether hand movements taught to children turn into more authentic gestures as children gain understanding of mathematical equivalence problems (e.g.,  $2+3+8=+8$ ). If imitated movement only becomes true gesture once it represents a speaker's knowledge (either explicit or implicit), we would expect children who learn from gesture to move their hands in systematically different ways than children who do not learn. If the movements of learners and non-learners do look different, in what ways do they differ and when do these differences emerge?

To address these questions, we developed a novel gesture coding technique, which uses a Python program to identify continuous movement characteristics, including gesture speed, acceleration, and changes in hand shape. We coded videos from a previous study (Goldin-Meadow et al., 2009), in which third and fourth graders were taught to produce gestures that contained a correct or partially correct grouping strategy while expressing an equalizer strategy in speech. Our preliminary results suggest that the way children perform the movement they are taught predicts whether or not they will learn from it. In particular, learning from a correct gesture seems to be associated with producing slower movements, accelerating more slowly, and transitioning from two fingers to one finger more leftward in space. We also found that learners, on average, began their movement before their spoken utterance, while non-learners started their movement around the same time as their speech, suggesting that the integration between children's movements and speech may also be a marker of their knowledge. Importantly, these differences between learners and non-learners emerged right before learners began solving problems correctly, which suggests that the body not only reflects children's cognitive processing, but also influences it.

Keywords: gesture, movement analysis, learning, mathematics

# Choosing the right product to buy: Pointing for requesting

Katariina Harjunpää, Lorenza Mondada, Kimmo Svinhufvud

University of Helsinki – Finland

The starting point for this paper is a simple recurrent phenomenon. At the counter, in shop encounters, very often customers point at the objects they are requesting. Although the request for a product at the counter can be formatted by simply saying its name (e.g., "une baguette" said at the bakery), most often customers also point at the product while uttering it. The paper examines the way in which pointing is temporally shaped in requests, and more generally the way in which customers adopt specific bodily and spatial orientations towards objects and objects' locations while choosing the product they want. The study is based on a large corpus of video recordings done in bakeries in Finland, Switzerland, France and Germany. Preliminary analyses show that pointing gestures co-occurring with requests can take a rich variety of trajectories and shapes—e.g. they can be very fast and not specifically recipient designed, or they can be progressively publicly displayed for the recipient. These trajectories, together with specific verbal turn formats of the turn, manifest that the request may be concurrent with or the product of other activities, such as searching for a product, checking its availability, choosing it on the spot, etc. (vs. requesting a product already selected and identified). These ways of orienting towards the object also display the type of product (e.g., a basic, default vs. special item) and the type of customer making the request (e.g., a routine vs. an occasional customer). So, cases in which the customer knows the ordinary product s/he routinely buys contrast with cases in which the customer chooses a product s/he spots in the display stand – where s/he might orient to its shape and visible features, but s/he might not know its name and the exact ingredients. This rich array of possibilities shows that customers do not just request something at the counter, but might engage in several other actions at the same time, such as choosing, searching for, checking, etc., and target several types of objects to refer to within diverse multimodal practices – such as pointing and naming, pointing at something they recognize but ignore the name of, or pointing at something specific and distinct from other items of the same class. The very shape and temporality of the gesture has an impact on which action is precisely produced. Thus, the paper shows the contribution of the study of the details of gesture to the issue of action formation. This issue will be discussed on the basis of data in several European languages.

Keywords: conversation analysis multimodality, pointing, requesting, shop encounters

# 'The art of Grasping' by Textile artist Ruchama Hoed

Ruchama Hoed

Graduate 2008, Visual Art department Textiles, Goldsmiths College, London, (UK)

As an artist I give shape to my imagination by trying to somehow make life tangible.

My gestures are directed by the desire of grasping ideas, feelings, encounters & moments in time and making them last.

In my work I consider Gesture as a bridge between idea & its manifestation. Grasping is a gesture that implies to me both the desire to obtain as well as a physical movement that offers a bridge between thought and materialising an idea. Setting the premise of using gesture informed by the craft of needlework to create with, helps me to choose the gestures and materials that create the shape of my expression... embroidered traces of moments in time...

I propose to talk about gesture in my artistic practice and the way the use of the grasping is a bridge to make the invisible visible in a physical as well as a metaphorical way. Together Inspiration (concept) Grasping (premise) and Gesture create a 'Space of Encounter' that makes the body move to make life visible...

-Concept - inspiration or idea, philosophical startingpoint of making life tangible through the use of textile practices.

-Grasping - suggestive gestural material to embroider the idea into matter with.

-Gesture - a necessary movement to translate my idea into matter, embodiment, handwork, craft-gestures.

-Texture - the visible, tangible material and the result of the elements above put together as a piece of artistic expression.

One of the threads of my practice as a trained (conceptual) textile artist is the movement between skill (craft) & concept. Gesture informed by craft plays an important role in my work and for this presentation the premise of using the gesture of Grasping as my concept-material through which desires are made visible by gestures, bridging the gap between idea and its realisation. In my artistic training the emphasis was largely on conceptual development, secondary seemed the development of skill. Craft contains a body wisdom that concepts can feed on to create, complement and complete.

I propose to contribute to your symposium by offering an interactive and participatory poster-space through which my thoughts are exemplified by an invitation on-site as well as demonstrating previous work that I have made in relationship to this topic.

Examples of my work:

'Shadow- Embroidery' performance- capturing fleeting shadows with needle& thread

'Dance me' video- inhabiting shadow- a dance of animating a shadow from the inside out.

'Me& my shadow' -video work of a shadow 'Pas-de-Deux'

'Embroidery Wonderwall'- an invitation to leaving traces of conversations and encounter s between people and ideas, through gestures with needle and thread.

Keywords: visual art, grasping, shadow



# The role of gestures during videoconferenced lexical explanation sequences

Benjamin Holt \* 1,2

<sup>1</sup> Interactions, Corpus, Apprentissages, Représentations (ICAR) – Ecole Normale Supérieure - Lyon, Université Lumière - Lyon II, CNRS : UMR5191 – 5, av Pierre Mendès-France 69676 BRON CEDEX, France <sup>2</sup> Laboratoire Parole et Langage (LPL) – Université de Provence - Aix-Marseille I, CNRS : UMR7309 – 29 av. R. Schuman - 13621 Aix-en-Provence cedex 1 - France

Our corpus is comprised of weekly pedagogical interactions between future teachers of French enrolled in a master's program at the University of Lyon 2 and undergraduate business students at Dublin City University learning French at a B1-B2 level in preparation for an internship in France. These interactions, which took place during the fall semester of 2013, were mediated by a videoconferencing platform and collected using screen recording software. These audiovisual data are part of the ISMAEL corpus (Guichon, et al., 2014) which is being used to study multimodality in a videoconferencing environment. The current study will focus on lexical explanation sequences. Lexical explanation sequences come in many forms and can be auto or hetero-initiated, involve one or many students, contain lateral sequences, etc. (Lauzon, 2008, 2009). Lauzon (2008) proposes a canonical structure in which each lexical explanation sequence contains an opening, core and closing. We propose a multimodal analysis of these sequences and their various phases. From a multimodal perspective (Baldry & Thibault, 2006), semiotic resources are selected, combined and integrated such that the meaning-making value of the ensemble cannot be reduced to the sum of each modality. As Sindoni (2013: 6) points out, video chat is "a new form of interaction that makes use of unprecedented combinations of language and other semiotic resources." The aim of this study is thus to analyze the ways in which the teacher-trainees use and combine the semiotic resources at their disposition (voice, gestures, facial expressions, text chat) to negotiate the meaning of unknown words with their learners.

In language classrooms, gestures made with the hands and body can be used to fulfill practical and necessary pedagogical functions, and are thus of utmost importance to foreign language teachers (Tellier, 2008). While explaining action verbs to non-natives in a face-to-face setting, teacher trainees were found to make gestures that are larger and more iconic than usual (Tellier & Stam, 2012). In a videoconferencing setting, however, the view of the teacher's body is drastically reduced, making larger gestures in the extreme periphery (McNeill, 1992) invisible to the learner. However, teachers adapt to this technological constraint (Develotte, et al., 2010), making some gestures visible to the webcam, while facial expressions help to compensate for reduced corporal visibility (Cosnier & Develotte, 2011).

Over time, the way in which teachers have used their bodies has changed and evolved with different teaching methods (Cadet, 2014). Furthermore, each teacher has their own gestural profile that changes according to the situation (Tellier, Michel, & Wolff, 2014). It behooves us therefore to investigate, through a multimodal lens, the ways in which explication sequences are carried out in a videoconferencing context while paying special attention to the role of gestures and facial expressions.

Keywords: multimodality, videoconferencing, lexical explanation, teaching gestures

# Temporal domains of co-speech gestures and speech prosody

David House, Simon Alexanderson

Department of Speech, Music and Hearing (KTH) – Stockholm, Sweden

The interaction between gesture and speech has been receiving growing interest in both the gesture and speech communities [1]. The main goal of this study is to examine the temporal coordination between co-speech gestures and speech prosody using high-quality audio, video and motion-capture data which allows automatic extraction and analysis of gesture and prosodic aspects of the speech signal. Using this data, we explore the correspondences between co-speech, gestural domains and prosodic domains to try and more closely define the temporal domains of co-speech gestures. Kendon [2] and McNeill [3] have divided gestures into gesture units, gesture phrases and gesture phases. The stroke phase of a gesture phrase is particularly interesting as some of these strokes (or "beat" gestures) often coincide and appear to be synchronized with prosodic and intonational peaks related to prominence such as pitch accents [4][5]. In an earlier study we investigated head nods with the syllable as the temporal domain [6]. The head nods were generally coordinated with the syllable, but began on average slightly before the accented syllable. This is consistent with the literature on temporal synchronization of short-duration co-speech gestures.

Synchronization between the phrase level of intonation and gesture phrases has also been studied but has been found to be more variable [4] [7]. We have now turned our attention to the longer domain of the gesture unit. We automatically extracted hand motion which was divided into discrete segments corresponding to gesture units for three spontaneous dialogues. The alignment between the onsets and offsets of these gesture units and automatically extracted talk spurt sequences was measured. Gesture profiles for each dialogue were obtained by plotting the proportion of gesture movement co-occurring with each talk spurt to obtain a gesture saturation measure. We found considerable individual variation in the profiles and the level of gesture saturation, but there was a general tendency for the talk spurts to slightly precede the gesture unit. This shows a timing trend contrary to that appearing between head motion and the syllable.

We further examined the ends of the gesture unit which ended before or after the talk spurt. We found that gesture activity ending prior to the end of the talk spurt correlated with turn yielding while gesture continuation after the talk spurt was indicative of turn holding. In summary, beat gestures can be seen to share the time domain of the syllable while gesture units share the time domain of the talk spurt. Moreover, this could indicate that on a global temporal domain, speech precedes gesture, while on the local domain of the syllable, gesture precedes speech. Finally, gestural timing at the ends of talk spurts can have a turn-regulating function.

Keywords: temporal coordination, gestural timing, gesture units, prosody, beat gestures, spontaneous dialogue, turn taking



## Putting the "body" in embodied language learning

Amy Hubbard <sup>1</sup>, Marco Grawunder <sup>2</sup>, Constantin Wirth <sup>2</sup>, Christian Büning <sup>2</sup>

<sup>1</sup> German Sport University Cologne (DSHS) – Department of Neurology, Psychosomatic Medicine, and Psychiatry Institute of Health Promotion and Clinical Movement Science German Sport University Cologne Am Sportpark Müngersdorf 6 50933 Cologne, Germany <sup>2</sup> German Sport University Cologne (DSHS) – Institute of Dance and Movement Culture Am Sportpark Müngersdorf 6 50933 Cologne, Germany

A compelling body of evidence shows-both behaviorally (e.g., Macedonia, 2014) and neurologically (e.g., Straube et al., 2009)-that gestures aide second language (L2) lexical learning. These recent data are not surprising, given the long history of observations on the connection between speech and gesture (e.g., Quintilian, 60 A.D., Efron, 1941). Behavioral findings demonstrate that spontaneous co-speech gesture production is linked to the language being spoken, situating the relationship between language and gesture firmly within the theoretical models of integrationism and embodiment and the framework of Vygotskyan Sociocultural Theory (Harris, 2003, Gullberg, 2006, Negueruela & Lantolf, 2008). A number of investigations of neural processing demonstrate an interconnection between motor and language systems, further supporting theories that posit a tight bond between language and gesture (e.g., Pulvermüller et al., 2005). Here, a team of experts in applied linguistics and TESL, neuroscience, movement science, and dance combine their areas of expertise with the goal of using movement to teach L2 German learners perception and production of the many layers of meaning in co-speech gesture and the accompanying speech. Most research on gesture and L2 learning has focused on iconic and metaphoric gesture (cf. McNeill 1992). In this work, we utilize the multiple layers of gesture (i.e., rhythmicity, iconicity, metaphoricity; cf. McNeill, 2005) as different instructional tools in the German L2 classroom to teach students pronunciation, rhythm, intonation, and semantics. To begin, we utilize the original musical instrument, i.e., the human body, as a tool for teaching second language learners how to perceive and produce the rhythm and pitch changes (i.e., speech prosody) of the German language. Here, students are guided in the use of body percussion (i.e., sounds produced using the body, such as stomping the feet and snapping the fingers) to represent pitch and volume changes as well as vowel-sound extensions in German speech. Within this reflective creation of rhythm, stressed words come to have the strongest representation, leading to students' discovery of beat gesture and the often rhythmical aspect of gesture. At each stage of student discovery, explicit discussion of speech elements are discussed; for example, the consistency of word stress and the variation and impact of sentence/phrasal stress. After practicing German dialogue with body percussion, students practice producing conversational speech rhythm and intonation without body percussion. Students then create gestures while rehearsing a scene in German, followed by presentation of the scene and discussion of German co-speech gesture. In this way, students are guided in their development of speech fluency during face-to-face conversation in the real world.

Keywords: second language teaching, beat gesture, body percussion, embodiment, multimodality

# In the way of conceptualization of the space in multimodal communication from childhood to adulthood

Elnaz Jalilian

Linguistique et Didactique des Langues Etrangères et Maternelles (LIDILEM) – Université Stendhal - Grenoble III – UFR des Sciences du Langage - BP 25 - 38040 Grenoble cedex 9, France

Structuring the domain of space by language is fairly complex. Language in its communicative aspect in a real situation is accompanied by gestures in referring to a special event. There are different systems in the level of closed-class elements within a specific language which play an important role in structuring the space. As mentioned by Talmy (2000) among those systems, there are some which involve the conceptual structuring of space under the general title of schematic systems which characterize different kinds of relationships among entities within space and each of them add a different conceptual dimension to structure the space in the language: configurational structure, perspective point, distribution of attention and force dynamics. As long as each of these systems put their trace on the scene, they could be accompanied by gestures and this accompaniment develops with age. For my study when it comes to gesture-speech relation with a developmental approach, I have analyzed the development of the four above systems in their relation with gesture.

Studies that experimentally investigated the way gesture and speech express motion events in a comparative framework (Hickmann, Hendricks & Gullberg, 2011; Özyürek & Kita, 1999; Özyürek et al., 2008, among others) have come to the shared assumption that when encoding for motion and path, gesture production is more likely to be redundant to the verbal information it co-occurs with. However, this pattern of distributed information between both modalities does not show constancy when considering language development. On the other hand, schematic systems as conceptually structuring the space while inevitably being accompanied by gestures have not yet been analyzed with a developmental approach. We need more data on different languages as well as on different ages to better understand how and when languages conceptually

structure the space across cultures while still some aspect of them are universal.

We have focused here on three languages: French, Azerbaijani and Persian. In order to investigate the expression of motion events in these languages and both modalities within a naturalistic method, we used an animated cartoons as the stimulus and asked our 114 participants in three age groups: children, adolescents, and adults to narrate in their own language what they had seen. The video extracts showed a wide range of spatial references. The data was transcribed and annotated on ELAN for clauses, words and hand gestures.

Our first results showed distinct patterns in three age groups within three languages. The four schematic systems in conceptually structuring the space inter-relate with gestures by adding distinct conceptual dimension. To convey a particular conceptualization of a scene, the speaker chooses (verbally or gesturally) a range of alternative structural characterization offered by each system.

Keywords: Space and language, perspective point, cross cultural, distribution of attention, age, language acquisition

# The Multimodality of Interjections

Guillaume Jaudhuin

Langues, Textes, Arts et Cultures du Monde Anglophone (PRISMES) – Université Paris III - Sorbonne nouvelle  
– UFR du Monde Anglophone, 5 Rue de l'Ecole de Médecine, 75006 Paris, France

Over the past 250 years, the close relation between interjections and body movements or gestures has been thoroughly discussed (Beauz'ee, 1767; Darwin, 1872; Ameka, 1992; Stange and N'ubling, 2014). And yet, though the advent of video technology has helped to capture our ephemeral body movements (Mittelberg 2007), so far very few scholars have studied interjections by taking into account both voice and body so as to reveal their richness and complexity in interaction. When a speaker produces an interjection, he or she relies on the word itself and a vast set of semiotic means so as to construct meaning. An interjection is a complex and hybrid element of language that must be analysed as an integrative multimodal marker. In this paper, I argue that interjections are multimodal by nature, hence the necessity to analyse speakers' verbal, vocal and visual resources in interaction.

The objective of the paper is twofold: 1) to highlight the multimodal nature of interjections and 2) to identify the various components of their complexity and richness in face-to-face interaction. Two relatively new interjections, namely French "Genre" and English "as if", will serve as examples. Although they share a considerable number of similarities and are regularly used by teenagers and young adults, so far little research has been conducted on them.

The multimodal and multilevel approach I propose brings together gesture studies (McNeill, 1992; Kendon, 2004), French speaker-centered approaches to language (Blanche-Benveniste & Jeanjean, 1987; Morel & Danon-Boileau, 1998), multimodal conversation analysis (Streek, Goodwin & LeBaron, 2001; Mondada, 2009), linguistic anthropology (Ochs, 1996; Enfield, 2009), and studies on interjections (Ameka, 1999; Jovanović, 2004).

Numerous examples taken from original and more synthetic data, transcribed and annotated with ELAN, will illustrate my point. The first part of the corpus contains semi-guided monolingual discussions between pairs of friends who discuss life in general (two hours). The Francophone part of the corpus consists of 6 native speakers of French and the Anglophone part of 6 native speakers of British English. The second part of the corpus consists of a large number of occurrences from films, television series, and TV shows.

The results show that the speakers integrate a wide range of visual and vocal resources, involved in the co-construction of meaning in interaction, which they synchronise simultaneously and sequentially when uttering these interjections. The multimodal resources are expressed through facial expressions, head postures, eye gaze, shrugs, manual gestures, and prosody. The ensemble of resources used by the speakers marks various dimensions of the interjectional forms of "genre" and "as if" within a consistent semantic-pragmatic network. The analysis of the interplay of modalities in the construction of meaning happens to be a privileged locus to account for the complexity of interjections.

Keywords: multimodality, interjections, interaction, genre, as if

# Alignment of sentence focus and gesture in spontaneous English conversations

Jakub Jehlicka

Faculty of Arts [Prague] – Nám. Jana Palacha 2, 116 38 Praha 1, Czech Republic

An apparent correspondence between speech-accompanying gestures and the structure of information in discourse has previously been addressed (Kendon 2004; Jannedy & Mendoza-Denton 2005). However, due to the lack of gesture-annotated multimodal corpora, attempts to carry out a quantitative analysis of the relationship between gesture and information structure have been rather scarce. Ebert and colleagues (2011) investigated the temporal alignment of gestures, intonation peaks and focus in German and found that the gesture-phrase peaks systematically precede the focal expressions. In my poster, I will present the outcomes of a study of how the speech-accompanying gestures align with the sentence focus and intonation in English. In English, one might expect a similar pattern as in German. In order to shed light on the role of gesture in focus marking in English a study is being carried out using conversational material from the AMI-meeting corpus (Carletta 2006). The AMI-meeting corpus is a freely available resource consisting of more than 100 hours of English conversations recorded during business meetings. The corpus has already been annotated for gestures and a number of other non-verbal as well as discourse features. Yet, for the purposes of my analysis further annotation is being provided (especially annotation relating to information structure and prosody). The analysis will focus on the temporal co-occurrence of the gesture phrases peaks (Kendon 2004), the focal information units (Van Valin 2005) and pitch accents (Leohr 2004). Results of this analysis will be compared with the findings from German (Ebert et al. 2004).

Furthermore, this study will serve as a starting point for a subsequent cross-linguistic comparison of the focus marking using gestures that will include Slavic languages (Czech and Russian), i. e. languages with more flexible word order than the Germanic languages, and thus with a wider repertoire of the syntactic means of focus marking.

## References

- Carletta, J. (2006). Announcing the AMI Meeting Corpus. *The ELRA Newsletter*, 11(1), January-March, p. 3–5.
- Ebert, C., S. Evert & K. Wilmes (2011). Focus Marking via Gestures. In: Reich, Ingo et al. (eds.), *Proceedings of Sinn & Bedeutung 15*. Saarland University Press: Saarbrücken, Germany
- Jannedy S. & Mendoza-Denton, N. (2005). Structuring information through gesture and intonation. *Interdisciplinary Studies on Information Structure*, 3, 199–224.
- Kendon, A. (2004). *Gesture: Visible Action as Utterance*. Cambridge: Cambridge University Press.
- Loehr, D. (2004). *Gesture and Intonation*. [PhD. dissertation]. Georgetown University, Washington (DC).
- Van Valin, R. (2005). *Exploring the Syntax-Semantics Interface*. Cambridge: Cambridge University Press.

Keywords: Speech accompanying gestures, Information structure, Focus, Intonation, English, German

# Effects of Gesture Frequency on Discourse Quality in Aphasia

Theodore Jenkins, Marie Coppola, Carl Coelho

University of Connecticut (UConn) – 850 Bolton Rd, Storrs, CT, 06269, United States

Hand gestures are a communicative modality that frequently adds visual information to a spoken utterance (McNeill, 1992). Additionally, gesture has been shown to facilitate cognitive and linguistic processing, such as single-word lexical retrieval and second language learning (Rose, 2006; Kelly et al., 2009). Individuals with aphasia often demonstrate increased gesture frequency, which has been characterized as a response to difficulties with language processing (Sekine & Rose, 2013). However, if active hand gestures can facilitate linguistic processing, could gesture affect cognitive resources available for sentential complexity and discourse organization? In Study 1, we investigated if gesture frequency is associated with increased levels of complexity and organization in individuals with Broca's aphasia, a type of aphasia associated with impaired syntax. Using an online database of aphasic language samples (i.e. AphasiaBank; MacWhinney et al., 2011), we analyzed the narrative retellings of the story of Cinderella for individuals with Broca's aphasia ( $n=29$ ), diagnosed via the Western Aphasia Battery (Kertesz, 1982), and a control group ( $n=29$ ). Videos of narrative samples were coded for complexity (i.e. number of subordinated clauses), narrative organization (i.e. story grammar), and gesture frequency. Correlational data for the aphasia group suggested no significant relationship between gesture frequency with complexity ( $p=.295$ ) or discourse organization ( $p=.976$ ). The control group had a marginally significant inverse correlation for complexity ( $p=.066$ ), but no significant correlation for discourse organization ( $p=.976$ ). Interestingly, this suggests that simply gesturing a lot does not lead to increased language production in this aphasia group, and perhaps has a detrimental affect for micro-levels of language production (i.e. sentential complexity) for the control group. However, it is unclear if these results can generalize to other types of aphasia where fluency isn't impaired. As a follow up, we wanted to see if the absence of a syntactic impairment in aphasia could influence the relationship between gesture production and discourse measures. In Study 2, we examined a group of individuals with anomic aphasia, an aphasia associated with problems of lexical retrieval but not typically with syntax. Following the same methodology of Study 1, we analyzed 41 transcripts from the same online database for gesture frequency and the language measures. Correlational data showed significant correlations between gesture frequency and complexity ( $p=.000$ ), as well as narrative organization ( $p=.000$ ). These findings suggest that frequent gesture in anomic aphasia may serve as a heuristic for discourse production. However, it is unclear if frequent gesture is aiding cognition for discourse measures through facilitation of lexical retrieval problems associated with this type of aphasia. Future directions will look at whether or not gesture frequency plays a part in lexical access, and whether or not gesture type may play a role in the discourse measures for these aphasia and control groups.

Keywords: Narrative, Organization, Sentential Complexity, Gesture Frequency, Aphasia

# Placement and removal events in Joola Kujireray

Chelsea Krajcik

School of Oriental and African Studies, University of London (SOAS) – United Kingdom

This research presents a description of the domain of placement and removal events as expressed by speakers of Joola Kujireray, spoken in the lower Casamance region of Senegal in West Africa, by observing the co-speech manual gestures of speakers. Placement and removal events are described as "caused motion events involving an action where an agent causes an object (the figure object) to move to an end location (a goal ground) to which it will relate in a resulting spatial relationship" (Gullberg, 2011:7). This event domain varies cross-linguistically, both on a syntactic and semantic level. Speakers retrieve particular lexical items depending on the varying features found within an event, i.e., a figure's size, shape, or position, or features of the ground, such as whether or not the figure is contained or is on a flat, horizontal surface.

Joola Kujireray is a language of the Atlantic family. It is the nominal language of the village Brin, with approximately 500 speakers and a recent grammatical description completed by Dr. Watson from 2011-2015.

This poster presents research carried out in the fall of 2015 through elicitation sessions and two Director-Matcher tasks adapted from the Put Project (Bowerman, Gullberg, Majid & Narasimhan, 2004) and the Caused Positions (Hellwig & L'upke, 2001) set. 18 participants between the ages of 18 and 29 completed the task. Preliminary results show that Joola Kujireray has a complex verbal system of expressing placement and removal events, including both broad and fine grained semantic information in verb roots. This system includes the use of positionals such as -fil- 'lie' and -il- 'stand' for certain inanimate figures. The observation of co-speech gestures have provided insight to finer-grained semantic differences between verbs, both for example, the more semantically-general verbs such as e-ba 'to put; to hold; to put down' and e-kan 'to put; to do; to make', and for the semantically-specific verbs, e-toot 'to pick up', e-jop 'to pick up a quantity of X by hand', and e-women 'to gather items together'. Co-speech gestures were coded for handshape and show additional semantic information of the figure's size and shape. Furthermore, these gestures express contrastive manners of motion, aiding the description of the verbs' semantics.

This poster presents the semantics of a selection of verbs in Joola Kujireray and describes the various features of the figure and ground determining the choice of verb used. This research also serves to advocate for the incorporation of co-speech gestures as it provides additional semantic information which is valuable to the description of a language. Providing a description of the co-speech gestures and the semantic information expressed in both modalities sheds light on the extent of cross-linguistic variation by speakers in the domain of placement and removal events.

Keywords: placement events, semantics, minority language, Senegal, co, speech gestures



# How much turning is in an apple turnover?

Angélique Laurent<sup>1</sup>, Maria Graziano<sup>2</sup>, Elena Nicoladis<sup>3</sup>

<sup>1</sup>Université de Sherbrooke (CANADA) – 2500, boul. de l'Université Sherbrooke QC J1K 2R1, Canada <sup>2</sup>Lund University [Lund] – Paradisgatan 2 Box 117, SE-221 00 Lund, Sweden <sup>3</sup>University of Alberta – Canada

Co-speech gestures can reflect simulated actions (Hostetter & Alibali, 2008). These simulations can be affected by cross-linguistic differences in conceptualization. For example, speakers of satellite-framed languages can differ in the packaging of gestures relative to speakers of verb-framed languages (Kita, & Özyürek, 2003; Kita, Özyürek, Allen, Brown, Furman, & Ishizuka, 2007). By examining the gestures of speakers of different languages, we can test whether these cross-linguistic differences in conceptualization appear when speakers think for speaking (Slobin, 1996) or whether these differences exist even when speakers are silent. There is some evidence to suggest that the differences appear only during speech: Özcaliskan and Goldin-Meadow (in press) showed that Turkish and English speakers packaged their co-speech gestures according to the spoken verb-framed and satellite-framed (respectively) constructions. When asked to gesture without speaking, Turkish and English speakers all produced the same kinds of hand movements. To further test this hypothesis, we asked French-English bilinguals to mime how particular objects move or what one does with particular objects. The test included four different kinds of objects: 1) those that involved "turn" in the wording in both languages (e.g., turnstile and tourniquet), 2) those that involved "turn" only in French (e.g., tournesol lit. 'turn-sun' vs. sunflower), 3) those that involved "turn" only in English (e.g., turn on the tap vs. ouvrir le robinet lit. 'to open the tap'), and 4) those that involved turning in neither language. Following

Özcaliskan and Goldin-Meadow (in press), it was predicted that bilinguals' gestural representation of actions and objects would be alike in both languages.

Participants performed the task twice, one in each language mode. To induce a language mode, we first asked bilinguals to do a variety of tasks in the target language for that session (such as describing pictures or telling events of their life). The miming task was the last of each session. The dependent variables were the presence or absence of turning and the amount of turning each participant did in miming his/her response.

Preliminary analyses suggest that the amount of turning was not linked at all to the lexicalization of "turn" in the target item/language, rather highly dependent on how much turning the target object or the action done with the target object involves. These results are consistent with the argument that gestures take on the properties of corresponding lexicalization only when people are thinking for speaking (Özcaliskan & Goldin-Meadow, in press). They are also consistent with the argument that gestures simulate action (Hostetter & Alibali, 2008).

Keywords: Gestures, bilingualism, crosslinguistic comparison, simulated action

# Art of linguistic iconicity : Semiotic Plasticity and Adaptive Potential of Miming

Fanny Macé

Langue des Signes et Gestualité (LSG) – Université Paris VIII Vincennes-Saint Denis – France

In balance between art theories and language research, the pantomimes issue has been constitutive to sign linguistics. Sign languages (SL) were abusively assimilated to artistic pantomimes and to their negative properties (non-conventional, non-systemic and thus non- symbolic). Emerging sign linguistics established its legitimacy and sign languages' linguistic authenticity by marginalizing the miming semiotic phenomenon, all the more since its formal instability resisted to linguistic traditional analyze. Early studies have silenced the phenomenon or have considered miming as a gestural component. Along with Yau, who denounces "the highly questionable ostracism from which suffer those so-called pantomimes" in a study on semiogenetics (1992), Boutet, Sallandre and Fusellier denounce the use of the concept of 'pantomime' as an "outlet" (2010). Reductionist SL/pantomime assimilation collapses once adopted, for the study of artistic mimetic phenomena, an anthropological approach which integrates the diversity of mimed artistic performances within western and eastern traditions (L'égeret) and the productivity of ritual and sacred mimetic practices (Lorelle).

Around 1980, Cuxac's iconicity theory, our framework, grew away from the dominant linguistic paradigms. His theory integrated pantomimes to systemic analyze thanks to a semiological approach which identifies that non-lexical structures (transfer units) co-exist and potentially interact with standard signs (lexical units). Iconicity increases and decreases following structural and pragmatic needs (internal and external context). To illustrate how iconicity grows when requiring miming, we built a video corpus composed of spontaneous interactions in adaptive situations (emerging and international SLs). We examined how our main informant, Deaf and Cambodian, mimed while signing as he was a student at the National Center of Circus Arts in France. There, working as a base in pair acrobatics, he met non-signers, who were native speakers of different vocal languages, and signers of French Sign Language (LSF). Our pragmatic approach enables us to differentiate artistic mimed performances from signed and gestural ones. We also identified facilitating contexts for the emergence of mimetic phenomena (learning, playing, empathy).

Deaf people explicitly sign that there's a specific skill for linguistic adaptation that deals with mastering semiotic plasticity of mimed performances. We thus sought, first, to deconstruct traditional antinomies (mimesis/semiosis, praxis/logos) by pointing out the simulated nature of actions mimed for semiotic needs (Zlatev), and sought secondly to complete the semiological approach by pointing out the double nature of imitation, a both creative (entropic) and stabilizing (neguentropic) semiotic force (social mimesis, Gebauer&Wulf). Miming shouldn't stand any longer aside from linguistic field considering that language, as an art, also deals with creativity, and that mime arts, as gestural theater, also potentially deal with symbolic contents.

Keywords: pantomime, perfromance mim'ee, mimesis

# Understanding an unknown language: The use and perception of multimodal cues

Céline Maleval<sup>1</sup>, Marion Tellier<sup>2</sup>

<sup>1</sup> Laboratoire Parole et Langage (LPL) – Aix-Marseille Université – AMU – France <sup>2</sup> Laboratoire Parole et Langage (LPL) – CNRS : UMR7309, Aix Marseille Université – 29 av. R. Schuman - 13621 Aix-en-Provence cedex 1 - France

Previous studies investigated the role of multimodality and more precisely the role of gestures during speech production. A few of them evaluated the impact of multimodal cues in communication of meaning (Beattie & Shovelton, 1999 ; Holler, Shovelton & Beattie, 2009 ; Kok, Bergman & Kop, 2015 ; Kibrik & Molchanova, 2013) and, more specifically in foreign language comprehension and learning (Sueyoshi & Hardison : 2005 ; Sime : 2008 ; Tellier : 2009). Results showed that gesture and multimodal cues are effective when it comes to communicating semantic information, improving listening comprehension and memorization. In the present study, the main objective is to explore how multimodal cues are perceived and how they affect adults' oral comprehension of an unknown language (i.e. Portuguese). Moreover, this experiment investigates how multimodality is perceived through (1) a comprehension task as well as through (2) participant's discourse.

To create the stimulus for this perception task, we videotaped a Portuguese speaker during a storytelling task. She was instructed to speak as if she was addressing non native listeners. This recording provides various multimodal cues such as verbal intercomprehension possibilities (the participants' first language is French), facial cues and gestures. In this experimental task, participants should rely on multimodal cues available in the recording to understand speech.

Three conditions were created from the videotaped storytelling presentation. In the first condition (Audio-Only): listeners have access to the audio-phonatory modality only. The second condition (Audio-Video-Face) shows audio-visual cues conveyed by speech and the speaker's face. Finally, in the third condition (Audio-Video-Face-Gestures), participants have access to speech and visual cues conveyed by the speaker's body (hand gestures and face and body movements). The participants are given pictures that sum up the narration of the stimulus in a random order. First, participants listen to or watch the stimulus twice and then are asked to arrange the pictures in the order of the story from what they understood. We use results of the first task to quantitatively evaluate the listeners' comprehension and compare success rate in the three different conditions. We then interview the participants to determine which multimodal cues they perceived and used to understand the story and whether they are aware of their strategies.

Our main research questions are: How do participants use modalities to access meaning in a completely unknown language? Does the combination of modalities improve listening comprehension in a foreign language? Are the participants aware of their strategies?

We expect that results should show a gradual increase of success rate across conditions from

Audio-Only to Audio-Visual-Face-Gesture. The analysis of participants' discourse will highlight how multimodal cues are used when listening to an unknown language.

Since this is an ongoing research, results will be presented on the poster.

Keywords: multimodality, perception, comprehension, foreign language

# Role of Mirror Neuron System and Mentalizing System during hand gesture production: A meta-analysis

Mili Mathew<sup>1</sup>, Jie Yang<sup>2</sup>

<sup>1</sup>Dr. S.R.C. Institute of Speech and Hearing (DR. SRCISH) – Bangalore, India <sup>2</sup>Macquarie University – NSW 2019 Australia, Australia

Hand gestures are integral to the process of communication. Because gestures play such an important role in communication, the neural basis of gesture processing has been increasingly investigated (e.g. Andric & Small, 2012; Yang et al., 2015). Studies have shown that the mirror neuron system (MNS, Gallese et al., 2004) and the mentalizing system (Spunt & Lieberman 2013) are involved in gesture comprehension (Lotze et al., 2006; Straub et al., 2013), however, evidence of how the two systems are activated during gesture production is scattered and the conclusion is unclear.

Therefore, the current meta-analysis used the activation likelihood estimation method (ALE, Eickhoff et al., 2009) to investigate the overall brain effects for gesture production and the brain effects for different aspects of task performance (e.g., planning, execution, and imitation). We predicted that MNS (e.g., PMv and IPL) would be involved in gesture production tasks that required gesture recognition, execution and the mapping between observed actions and one's own motor presentations, and mentalizing system (e.g., medial PFC, cingulate cortex, and precuneus) would be mainly involved in gesture production tasks that required participants (gesture producers) to infer the intention (putative) of gesture receivers (listeners).

Eight studies were selected based on PubMed database search (Bohlhalter et al., 2009; Committeri et al., 2015; Fridman et al., 2006; Lindenberg et al., 2012; Mainieri et al., 2013; Montgomery & Haxby, 2008; Montgomery et al., 2007; Schippers et al., 2009). Previous research has shown that although both the MNS and the mentalizing system are involved in understanding others' mental states, they seem to be functionally segregated (Marsh & Hamilton, 2011). In a similar vein, the meta-analysis results showed that both systems (inferior parietal lobule and medial cortical structures) were involved in gesture production, to varying degrees. The MNS and the primary motor cortex were selectively involved in gesture execution, whereas the mentalizing system and the premotor cortex were selectively involved in gesture planning. Significant effects were found in both systems during gesture imitation. The former may be involved in the processes that require the mapping between observed actions and motor representations (imitation) or the retrieval of motor representations (execution); whereas the later may be involved when the production tasks require understanding others' mental states (planning and imitation). However, the involvement of the two systems suggests that producing gestures requires representations of others' mental states, and that these representations might be built at multiple levels (Sperduti, Guionnet, Fossati, & Nadel, 2014).

One limitation of the current study is that only eight studies were included in the meta-analysis. However, the results are not unreliable, and it does indicate the involvement of both the MNS and the mentalizing system in the production of hand gestures.

Keywords: hand gestures, production, neural basis, meta, analysis

# Content coding disentangles individual components of complex multimodal and gestural stimuli in naturalistic scenes for fMRI data analysis.

Klaus Mathiak<sup>1,2,3</sup>, Dhana Wolf<sup>1,2,3,4</sup>, Linn-Marlen Rekittke<sup>4</sup>, Fengyu Cong<sup>5</sup>, Annina Haeck<sup>1</sup>, Saurabh Bhavsar<sup>1</sup>, Martin Klasen<sup>1,2,3</sup>

<sup>1</sup>Department of Psychiatry, Psychotherapy and Psychosomatics, Medical School, RWTH Aachen University – Germany <sup>2</sup>JARA-Translational Brain Medicine, Aachen / Jülich – Germany <sup>3</sup>Interdisciplinary Centre for Clinical Research, Medical School, RWTH Aachen University – Germany <sup>4</sup>Natural Media Lab, Human Technology Centre, RWTH Aachen University – Germany <sup>5</sup>Department of Biomedical Engineering, Dalian University of Technology, Dalian – China

**Introduction** Gestures generally are part of complex social situations. Social cognitive neuroscience investigates contextualized, multimodal, and dynamic stimulus material such as video games or movie sequences [1,2]. To enable a theory-driven association of specific movie events with brain activity, we developed an objective content coding system based on semiotic and analytical categories encompassing bodily modalities of communication such as head movements and manual gestures.

Functional MRI recorded brain activity of 16 healthy German subjects watching a 20-minute sequence of the movie 'Lola rennt' (Run Lola Run, X-Filme Creative Pool, 1998, Germany). We developed the coding system by integrating semiotic and film analytic concepts [3,4] such as 'camera behavior,' 'symbols' or 'gestural interaction events.' These concepts were further broken down into 24 individual categories. On this basis we generated functional models and analyzed the neural correlates of these categories.

Inter-rater reliability varied between .2 and .8 between the different categories. Nineteen of the 24 categories were significantly associated with distinct brain activation patterns. Film scenes comprising speech induced robust activation changes of language processing-related areas such as the superior and middle temporal gyrus. Cinematography-related contents (e.g. zooming, tracking, and cuts) mainly altered activation of secondary visual cortex regions and parietal areas associated with visuo-spatial integration. Gestural interactions elicited increased neural activity in bilateral inferior frontal gyrus and anterior insula.

Content coding of movie sequences on a frame-by-frame basis is feasible and can generate a model to explain functional brain imaging data. Even rather abstract categories such as 'person-person interaction' were reliably and validly leading to meaningful neural activations. However, high interrelations between various content categories evidence the complexity of movies as stimulus material and calls attention to a careful interpretation of functional analyses. In particular, causal relationships between stimulus materials and brain responses can only be drawn under restricted conditions. For gestural interactions, a bilateral network involving Broca and its right-hemispheric counterpart indicates that relatively high degree of conventionality, e.g. the occurrence of symbolic signs, in human interaction may involve similar networks for speech and visual communication, e.g. through gestures and other visuo-spatial modalities.

**Keywords:** naturalistic neuroscience, content coding, fMRI, cospeech gesture, conventionality

# Expressing time through space: Embodying conceptual metaphors in an L2.

Anna-Lena Nilsson

The Norwegian University of Science and Technology (NTNU) – NO-7491 Trondheim, Norway

Human understanding of time is essentially metaphoric, with the most important metaphorical source domain being that of space, and consequently, the metaphor time as space is pervasive in languages around the world (Radden, 2003). For signed languages, expressions for time have frequently been discussed in terms of time lines (Friedman, 1975). A number of similar time lines have been described for several signed languages. Engberg-Pedersen (1993), e.g., describes Danish Sign Language, where the sequence [time] line is observed to run parallel to the signer's body, with locations to the signer's left associated with earlier points in time and locations more to the right associated with later points in time. The anaphoric time line has a spatially fixed reference point that has no default value, but must always be established in context. It extends outward diagonally from the signer's nondominant side. The deictic time line extends from behind the dominant hand shoulder of the signer and forward. Descriptions of the use of time lines tend to focus on the manual signal, and the structure of individual signs and/or where they are placed relative to each other in signing space. Less attention has been given to how signers move their whole body in signing space and whether these movements can be used to express time. However, recent research has shown that Swedish Sign Language (SSL)/Swedish interpreters who are native users of SSL (L1-interpreters) systematically use body movements in signing space to simultaneously layer iconic expressions of metaphors both for differences and for time (Nilsson, in press). Nilsson describes this as embodying metaphors, and each of the different conceptual metaphors the L1-interpreters embody is expressed in a distinct manner. For the general metaphor time as space, a sideways movement of the interpreter's body and/or hands is used, moving along the left-right oriented sequence line. To express the metaphor time passing is motion over a landscape (Lakoff, 1993) an interpreter may embody an "observer" by moving the body along the sequence line or the anaphoric time line. To contrast this previous work, the current study presents an initial analysis of interpreted discourse produced by six L2-interpreters (i.e. L2-users of SSL). Findings reveal striking differences in the body movements used by the two groups of interpreters, with differences in the amount of body movements, the type and quality of the movements, as well as what these movements are used to express. The analysis for this study focuses on the L2-interpreters' use of signing space for expressing time. To summarize the analysis, despite being very experienced, and considered fluent signers, these L2-interpreters do not seem to use the correct time line nor do they use their bodies to express time in the way L1-interpreters do.

Keywords: second language acquisition, metaphor and iconicity, sign languages, signing space, embodying metaphor, signed language interpreting



# Links between gestures and signs: semantic and interactional analysis of spoken and signed discourse

Sandrine Petit, Marie-Anne Sallandre

<sup>1</sup> Structure formelle du langage : typologie et acquisition, metrique et poétique (SFLTAMP) – CNRS : UMR7023, Université Paris VIII Vincennes-Saint Denis – France

We propose a semantic and interactional analysis of the links between coverbal asynchronic (non-lexicalised) gesture that accompanies spoken languages (gestures, gaze and mimeo-gesturalities) and the signs used by deaf signers in sign languages. We wish to discuss the existence of common roots between the two in order to highlight our approach/perspective, that gesture and sign have the same origin, both based on a process of iconisation of speakers/signers experiences. In other words, we consider iconicity to be a primary element at the foundation of all languages, whether it is spoken or signed.

Our initial results are based on a video corpus of eight hearing speakers with various first languages explaining a magic trick (and we need to make corpus in the future with the same material between French Deaf/hearings and Deaf/Deaf). Analysis of the data allowed us identify similarities that indicate the existence of analogous mechanisms between coverbal gesture and sign language, providing support to our perspective regarding linguistic iconicity as the source of human gesturality. In addition, we wish to clarify the "mystery of the posture-mimeo-gestural code", and show that human gesturality, whether as sign or gesture, is always present, whether the interlocutors are Deaf signers or hearing speakers. In re-examining the issue of human gesturality, we propose the idea that gesturality is not a secondary aspect, a substitution, but rather a/the central actor which determines the structure of the narrative.

Finally, our analysis reveals an area of thought that is not directly related to the vocalisation of spoken language. This stands in opposition to studies on co-verbal gesturality, which consider gesture and language to stem from the same, bimodal, communicative system. Rather, speech and gesture seem to stem from independent cognitive capacities, that operates simultaneously.

This conclusion leads us to hope that this study could serve as a basis for the development of a teaching method that would incorporate natural gesture to facilitate the acquisition of sign language as a second language by hearing adults.

Keywords: asynchronic gestures, signs, iconicity, corpus

# Expressive Gesture and Non-Verbal Communication in Popular Music Performance.

Liz Pipe

London College of Music, University of West London – United Kingdom

The visual representation of current, live popular music performance can be considered to be more akin to many aspects of theatre than ever before – not least through the physical embodiment of the persona of the performing musician, which has significant implications on how the music is perceived by both the performing musicians and the viewing audience. As a performing art, music relies on the use of the physical self and body in the communicative process, and may require more than technical skill and proficient instrumental handling to be truly communicatively effective – not least because, as stated by Juslin and Laukka (2003:774), ‘music is a means of emotional expression’. The areas of gesture and movement can be considered to allow the performer to express the meaning of the music through ways that are non-musical, and, on many occasions, these inclusions often become responsible for the nature of the musical sound and meaning. During the course of this paper, transcriptions of gestures from extracts of original video footage of rehearsals and live performances will be compared to an analysis of the musical output. Through an interdisciplinary theoretical framework, and by using a practice-led methodology, these extracts will then be analysed using Delalande’s (1988) typology of different musical gestures; allowing an examination of the implications and repercussions of the use of expressive gesture and non-verbal communication skills, in a variety of guises, on live popular music performance. In particular, findings will be presented on the ramifications of the inclusion of such visual stimuli on the actual musical content of a performance (such as the narrative meaning of the lyrics, and the pitching, tone and dynamic of musical phrases and performances), how such inclusions affect the perceived delivery of the performance by the delivering musician(s), and considers, in detail, the relationship between the gesture and the musical performance.

In addition, the demonstration of a specifically-designed, unique, interactive multimedia presentation allows the connection between theory and practice to be clearly demonstrated. Through case-study examples, and interviews with both students and professional practitioners, I provide evidence on how the areas of expressive gesture and non-verbal communication can be incorporated into an educational curriculum which places expressive delivery alongside the crucial area of instrumental handling in popular music performance.

Keywords: interdisciplinary, music, pedagogy, performance

# Exploring Gesture's Role in Teaching and Learning Science and English as a Second Language

Alessandro Rosborough

Brigham Young University (BYU) – Alessandro Rosborough MCKB 206-S Brigham Young University Provo, Utah, USA 84602, United States

A crucial aspect of learning the language of science in elementary classrooms includes the fundamental understanding that such knowledge is a form of participating in the world (Lemke, 2004). To understand new science content includes the understanding that practical and materialized engagement is at the root of entering a new discourse (Roth, 2009; Vygotsky, 1987). It is expected that the greater the novelty in speech language or vocabulary experience, the greater the increase in gesture compensation and referentiality (Gullberg, 1998; McNeill, 1992). This study explores the nature of the gestures between a teacher and her second grade English Learners (ELs) entering new science time discourses. The question not only arises as to the nature of science discourse and the role of gesture, but also to gain an understanding of how the gesture-speech ensemble functions in supporting second language learning and students' ontological development within the new discourse community.

The data display the interaction between the semiotic resources of the activity and their materialized bodily/speech-voiced acts. Five video recorded excerpts were selected from a databank of 27 days of an all English Learners second grade classroom. Using McNeill (1992) coding, data analyzed provide evidence of how the teacher's gestures and the students' embodied experience assisted in the enhancement of meaning, clarifications, and indexical orientations for entering, managing, and understanding the engagement and results of science-based tasks.

The results demonstrate the students' use of representational gestures and bodily positions in interacting with the content not only assisted in accessing and displaying science content but also created new opportunities for learning and extended their vocabulary with the topic. The teacher and students' gestures were found to construct orientation and intersubjectivity, with representational and deictic gestures supporting the construction of new topics and extending the language practice. Gesture use enhanced mental representations and spatial orientations of content not readily available through speech alone. In turn, this allowed the students to further inhabit their second language while meeting the languaging (Swain, 2007, 2009) needs of their classroom. In conclusion the new science discourse in their second language was an integrated system of speech and gesture that supported the operationalization of the tasks and supported the creation of the new discourse community.

Keywords: gesture, second language learning, science discourse, embodiment, intersubjectivity

# Phases of medical consultation : multimodal analysis of transitions

Jorane Saubesty<sup>1,2,3</sup>

<sup>1</sup> Aix-Marseille Université (AMU) – Ministère de l'Enseignement Supérieur et de la Recherche Scientifique – Aix-Marseille Université Jardin du Pharo 58, bd Charles Livon -13284 Marseille Cedex 07, France<sup>2</sup> Laboratoire Parole et Langage (LPL) – Université de Provence - Aix-Marseille I, CNRS : UMR7309 – 29 av. R. Schuman - 13621 Aix-en-Provence cedex 1 - France, France<sup>3</sup> Brain and Language Research Institute – Aix Marseille Université – France

Consultation with medical physician is organised in several phases (Byrne and Long 1976, Ten Have 1989, Cosnier 1993, Traverso, 2001). The different phases the authors are distinguishing are almost always similar. Even though the phases are presented in an organised and linear way, the interlocutors may navigate from one phase to another, in particular if different problems are evocated along the interaction (Ten Have 1989). The different phases have been well described in the literature (Heritage and Maynard 2005, Ten Have 2002) but little has been said about the transition from one phase to another: when does it appear? How is it done? By whom? This study aims at exploring this particular moment in the interaction looking at the different modalities that may be involved. We intend to do so using the analysis of interaction in a multimodal perspective. Previous studies have shown that the behaviour of the participants is evolving through the interaction (Guardiola et al. 2012). For example, during medical encounter, the doctor is usually the main speaker but appears to give the floor to the patient in the second half of the interaction when the latter thus become the main speaker (Vergely et al. 2011). Therefore, we suppose that the transitions might be produced differently through the interaction. The corpus analysed was created by and belongs to the Institut Paoli-Calmette (Marseille, France) and is an authentic corpus of training sessions for doctors involved in role plays with an actor playing the role of a patient. It is composed by 6 audio-video recorded interactions involving one doctor in training and one actor/patient. Each dialogue is about 15 minutes long. The participants are involved in a consultation to break bad news. In our case, the actor actually plays the role of the patient's relative.

We conducted both quantitative and qualitative analyses. Changes of topic were considered as changes of phase. Then, transitions were described in terms of the phases involved, speech production, co-speech gestures production (McNeill, 1992), gaze, head movements and posture (Tan et al. 2010) of each participant.

Preliminary results show that participants first tend to follow the linear order of the phases then they return to earlier phases when needed. In the first stage of the consultation, transitions are initiated by the doctor and follow the linear order, and then are initiated by the patient depending on the needs of the latter. Transitions are mostly introduced by statements when done by the physician, and by questions when done by the patient. Both types of sentences are accompanied by co-speech gestures. Interestingly, before each transition the patient is not reacting, meaning that he doesn't produce speech nor co-speech movements.

Keywords: phases, transitions, interaction, multimodality, doctor, patient

# Signs of (mis)understanding - Sign Language in Media, Sign Language in Gesture Studies

Pierre Schmitt

Ecole des Hautes Etudes en Sciences Sociales [EHESS] – 54, boulevard Raspail 75006 Paris, France

Exploring interdisciplinary bridges, this paper is questioning possible paths toward a single linguistic and semiotic model – understood as a unified theoretical and methodological frame – that would not only be available for the study of both vocal and sign languages – and their gestures, facial expressions...–, but for the study of deaf-hearing interaction where multiple languages and modalities are at stake. From Mandela funeral's aftermath<sup>1</sup> to Paul McCartney videoclip<sup>2</sup>, from Broadway<sup>3</sup> to Chicago's Soldier Field<sup>4</sup>, from mayor's Bloomberg<sup>5</sup> to mayor's de Blasio<sup>6</sup>, American Sign Language (ASL) has gained an unprecedented national and international media exposure.

Nevertheless, while Marlee Matlin has appeared on CNN to condemn Mandela memorial fake interpreter<sup>7</sup> and on twitter to back up Jonathan Lamberton<sup>8</sup>, mockery of Lydia Callis facial expressions, complaints about Johnny Depp and Natalie Portman lack of facial expressions, or denunciation of "Sim Com" (simultaneous communication) use on stage in Spring Awakening all bring about serious misunderstanding and/or sincere ignorance about sign language theory and uses.

Relying on a corpus of videos and materials related to the above-mentioned productions, events and debates in public space, pursuing a *mise en abîme*, this paper will precisely discuss sign language studies and linguistics in relation to gesture studies by analyzing media examples where the simultaneous use of multiple languages and modalities in the process of sign language interpretation makes it difficult or impossible to consider sign language or vocal language in isolation as a starting point for a relevant linguistic analysis. Studying language-s in (such) context, we will subsequently discuss these linguistic events as multimodal semiotic spaces.

Contemporary linguistic anthropology will provide insights for our discussion, somehow treating vocal languages like sign languages and possibly treating sign and vocal languages alike – as both multilinear and compositional. Indeed, taking into account bodies, eye-gazes and facial expression in the study of vocal languages, current researches in gestures studies or interested in multimodality are facing issues of transcription similar to current debates in sign language studies, and often rely on video and sketches as tools for analysis (Goodwin, 2007; Goodwin, 2010).

To conclude, this paper will intend to relate this theoretical issues to larger debates, hopefully allowing a better understanding on how deaf and hearing people build their lives in a shared world of interaction.

Indeed, while our scientific views on sign language are time and culture bound, historically conditioned, provisional, a call for models that foster equality among all speakers and all languages in presence is not only a matter of scientific analysis. It has to do with our own values about the world we study and inhabit.

<sup>1</sup><http://www.realinterpreter.com/> ;

<sup>2</sup><https://www.youtube.com/watch?v=f4dzzv81X9w>

<sup>3</sup><http://www.nytimes.com/2015/09/28/theater/review-spring-awakening-by-deaf-west-theater-brings-a-new-sensation-to-broadway.html?r=0>

<sup>4</sup><http://blogs.wsj.com/speakeasy/2015/07/08/deafheads-marked-a-milestone-of-their-own-at->

## Posters

final-grateful-dead-shows/

<sup>5</sup><http://www.huffingtonpost.com/2012/11/01/moods-of-lydia-callis-bloomberg-sign-languagen2058469.html>

<sup>6</sup><http://www.nytimes.com/2015/01/29/nyregion/weather-briefings-put-focus-on-mayor-de-blasios-sign-language-interpreter.html>

<sup>7</sup><http://edition.cnn.com/videos/us/2013/12/12/ebof-intv-matlin-mandela-interpreter.cnn>

<sup>8</sup><https://twitter.com/marleematlin/status/526546689629229056>

Keywords: sign language, media, gesture studies, facial expressions, multimodality, semiotic space..



# Iconicity in an emerging sign language: Comparing language generation and maintenance

Ann Senghas<sup>1</sup>, Ezra Plancon<sup>1</sup>, Carolyn Zola<sup>1</sup>, Jennie Pyers<sup>2</sup>

<sup>1</sup>Barnard College – United States <sup>2</sup>Wellesley College – 106 Central St. Wellesley, MA 02481, United States

Manual gestures can reflect the physical or motor characteristics of the things they refer to, as when the size of an object is depicted in the distance between the hands. In mature sign languages, such iconicity is ubiquitous. Iconic signs can depict varied aspects of a referent object (Taub, 2001; Figure 1). However, as signs change over time, some of their iconicity can be lost, and the iconic motivation becomes less transparent (Frishberg, 1975). Does the prevalence of iconicity in mature sign languages result from its usefulness during language creation, or because it can be leveraged during learning? A newly emerging sign language in Nicaragua provides an opportunity to see the forces in play at language's earliest stages. Nicaraguan Sign Language (NSL) was created by deaf children and adolescents who arrived in a new program for special education begun in the 1970s in Managua (Kegl et. al, 1999). Each subsequent age cohort to join the school community developed the language further (Senghas & Coppola, 2001).

We investigated the role of iconicity in language emergence by eliciting 350 everyday lexical signs from deaf NSL signers, from the First Cohort who entered in the 1970s (N=2; Mean age at test = 32.5), and from a Second Cohort who entered in the 1980s (N=2; Mean age at test = 21). All participants began acquiring NSL before the age of six. Signs were coded for frequency and type of iconicity expressed.

The majority of the elicited signs exhibited iconicity; the most frequent type represented objects by how they were handled. The prevalence of iconicity decreased by 10% as the language was passed from the First to the Second Cohort. Nearly all of that reduction was driven by a decrease in Handling iconicity.

These findings confirm that iconicity plays an important role in getting a sign language off the ground. This is particularly evident in the very first generation of deaf Nicaraguan children and adolescents: When they created a new lexicon, the majority of the signs they created were iconic. The prevalence of Handling iconicity, in particular, is unsurprising, given non-signing adults' tendency to gesture about how objects are handled (Goodglass & Kaplan, 1963). What was unexpected was the decreasing prominence of Handling iconicity as the language was passed down to the subsequent cohort of child learners. This change points to the different roles of adults and children in language emergence, and the different mechanisms applied when lexical items are coined, as opposed to when they are learned and perpetuated within a community.

Keywords: Nicaraguan Sign Language, language emergence, iconicity

# For a better understanding of the lexical-semantic structure of LSF

Yana Sennikova, Brigitte Garcia

UMR Structures Formelles du Langage (SFL) – Université Paris VIII Vincennes-Saint Denis – UPS-CNRS, 59 rue Pouchet 75017 Paris, France

The current presentation will show the first results of an on-going research on the morphosemantic structure of the lexicon of French Sign Language (LSF), highlighting the significance of form-function relations on the sub-lexematic level. Sign Language lexicons are typically described by means of the written words of spoken languages (SpLs), leading to some false representations of SLs. In our study we propose a model of a lexicon structure of LSF in its own terms, i.e. using SL features. The nature of the components of lexematic units is a divisive issue; the mainstream position (since Stoke 1960) viewing these as phonological units while the " semiological model " (among others) considers them as morphemes (e.g. Cuxac 2000, Sallandre 2003, Cuxac & Sallandre 2007, Garcia 2010, Garcia & Sallandre 2014). The focus of our study is the particularly dense form-meaning relations between LSF signs sharing the same component(s), a phenomenon already observed in other SLs (e.g. Fernald & Napoli 2000 for American sign language, Tobin 2008 and Meir & Sandler 2008 for Israeli sign language, Bonnal 2005 for LSF). According to Fernald & Napoli (2000), who suggest a proximity with " phonaesthemes ", the nature of these links does not rise from any of the morphological processes observed in SpLs (affixation, compounding, templates...) and merits an analysis in its own terms.

We aim to highlight two issues:

- What is the character of these connections and to what degree do they structure the LSF lexicon?
- What is the contribution of such a morpho-semantic network to the linguistic economy of SLs?

In order to address these issues, we elaborated a three-phase methodology:

- (i) We analyzed the most substantial lexicographic corpus for LSF (Girod et al 1997) in order to evaluate if and to what degree the concept of " family links " is structure-forming in SL;
- (ii) We completed the analysis in phase 1 with a fine grain analysis of metalinguistic discussions of 20 deaf signers on the recent lexical creations in LSF collected from the Creagest Corpus (Garcia and L'Hillier 2011) consisting of dialogues between deaf adult signers;
- (iii) The hypothesis defined in phases 1 and 2 are assessed through a set of tasks (to unify signs into families, to find an " intruder " in what we consider as signs families, to replace a sign by a more morphological suited sign) proposed to a group of deaf signers.

As we will show, form-meaning relations between signs, sharing one or several sub-lexemic components, are highly pertinent for the organisation of the LSF lexicon. Finally, our study also allows us to assess to what degree the nature of the links between signs that build the SL lexicon (as shown for LSF) are specific to these languages.

Keywords: french sign language (LSF), SL lexicon, sublexical components, form/meaning components, lexical family of signs, linguistic economy

# Advancement in the multimedia annotation tool ELAN

Han Sloetjes, Olaf Seibert

Max Planck Institute for Psycholinguistics (MPI) – Wundtlaan 1 6525 XD Nijmegen The Netherlands, Netherlands

ELAN is a multimedia annotation tool that is being developed by "The Language Archive" (TLA), a department of the Max Planck Institute for Psycholinguistics. It is a tool that is applied in various types of multimodal interaction research, research that incorporates audio and/or video recordings. With this poster and demo we intend to present the most recent achievements in what by now is a long history of continuous tool development and support. One area in which there have been new developments is assessment of interrater reliability. In order to evaluate the reliability of the coding produced by annotators, and through that the quality of the training and the instructions given to them, a quantitative comparison can be performed. And since there seems to be no common understanding of how best to assess time aligned annotations of multiple annotators (and especially where differences in the segmentation are concerned), ELAN now offers three different algorithms. The simple comparison method based on the extent and overlap of co-occurring annotations which has been part of ELAN for several years, is now complemented by two third party algorithms that take chance agreement into account (Holle, 2015, L'ucking, 2011). These agreement calculations can now be applied to an entire corpus whereby the user can select the tiers (i.e. the types of events) to be assessed.

Another novelty concerns a commentary framework that intends to improve collaboration of annotators working in a team setting. Comments consist of text linked to a segment of the media and possibly to a specific tier (a tier is an annotation layer in ELAN). These comments can be notes, remarks or questions concerning a specific event and can be stored as a reminder or shared with a colleague. The comments can be shared via email, a file sharing (cloud) service and/or via the DASISH [2] Web Annotator (DWAN) web service, a back-end for storing annotations to online content, e.g. web pages (Lenkiewicz, 2014). Comments typically are of a more temporary nature than annotations, they serve a purpose while the process of annotating is still ongoing.

ELAN allows to create annotations manually, but we have been involved in projects (e.g. AUVIS [3]) aiming at making semi-automatic segmentation and labelling possible. Recently the algorithms have been improved and the user interface to these algorithms has been streamlined. A workflow based on an initial automatic segmentation followed by manual correction in some cases already decreases total annotation time.

Furthermore there have been numerous smaller enhancements such as an export to Theme [4] format, more flexible tokenization of tiers, support for a language attribute on the level of tiers and so on.

<http://tla.mpi.nl/tools/tla-tools/elan/>

<http://dasish.eu/>

<https://tla.mpi.nl/projects/info/auvis/> <http://patternvision.com/products/>

Keywords: annotation, comments, commentary, interrater reliability, semi, automatic segmentation, tool

# Motoric characteristics of gestures and actions in elementary school children

Laura Sparaci <sup>1</sup>, Francesca Lasorsa <sup>1</sup>, Domenico Formica <sup>2</sup>, Eugenio Guglielmelli <sup>2</sup>, Olga Capirci <sup>1</sup>

<sup>1</sup> Institute of Cognitive Sciences and Technologies, National Research Council of Italy (ISTC - CNR) – Italy <sup>2</sup> Laboratory of Biomedical Robotics and Biomicrosystems, University Campus Biomedico (CIR - UCBM) – Italy

**Background:** Recent research suggests that gestures may bridge the gap between motor actions and language in childhood [Arbib, Gasser, Barr`es, 2014; Capirci, Contaldo, Caselli, Volterra 2005; Caselli, Rinaldi, Stefanini, Volterra, 2012]. However, only few studies have analyzed motoric characteristics of children's gestures and most use traditional video-coding rather than direct kinematic measures [Pettenati, Stefanini, Volterra, 2009]. In this study we report data on the use of wearable sensors alongside traditional video-coding to analyse motoric characteristics of actions and gestures in children. Despite their potential to measure children's actions in ecological settings [Campolo, Taffoni, Formica, Iverson, Sparaci, Keller, Guglielmelli, 2012; Ricci, Formica, Sparaci, Lasorsa, Taffoni, Tamilia, Guglielmelli, 2014], wearable sensors have never been employed to compare motoric characteristics of both actions and gestures in childhood.

**Methods:** This study reports data on 10 children (5 females and 5 males, mean age 7;1, range 6;3-8;0). As part of a larger study children wore a set of 5 wireless sensors at their school for 45 min sessions. All child spontaneous/imitated behaviors were videotaped for later coding. Children sat at a table and, using a set of 8 objects and 16 video-clips, performed 3 experimental tasks: (1) spontaneous actions: presented with each object (teapot) children produced a spontaneous action showing its use (pouring tea); (2) imitated actions: presented with each video-clip children saw an adult performing an action with the each object (pouring tea) and imitated the action with the object; (3) imitated gestures: presented with each video-clip children saw an adult producing corresponding gestures (POURING TEA) and imitated the gestures. Wearable sensors and video coding allowed analyzing both kinematic characteristics of actions/gestures strokes (e.g. acceleration) and handshapes of actions/gestures strokes.

**Results:** All children were able to produce/imitate the actions/gestures proposed in the study. Sensor data highlighted similar acceleration patterns during specific action and gesture strokes (e.g. action hammering and gesture HAMMER). Video coding showed no significant difference between types of handshapes produced by children during action imitation and gesture imitation ( $p = .89$ ). Furthermore, no significant difference emerged between types of handshapes produced by children during spontaneous actions and imitated gestures ( $p = .72$ ).

**Conclusion:** Similarities emerged in kinematic parameters of actions and gestures in elementary school children as measured by new wearable technologies. Furthermore, analysis of handshapes used to perform spontaneous/imitated actions with objects and imitated gestures showed significant similarities. Taken together these results highlight continuity between motoric characteristics of actions and gestures in children and shed new light on current studies suggesting a link from actions to gestures. Future research may consider other gesture parameters (e.g. location, movement) relying on both video coding and sensor technologies.

**Keywords:** gestures, motor actions, children, sensors

## Patterns of co-speech gesture in conversations involving hearing impaired adults and their frequent communication partners.

Karen Sparrow, Christopher Lind, Willem Van Steenbrugge

Speech Pathology Audiology, School of Health Sciences, Flinders University – GPO Box 2100, Adelaide 5001, South Australia, Australia

It is well accepted that participants in everyday face-to-face communication rely on visual information to augment and contextualize one another's spoken message. This is especially the case if the individual has a hearing impairment. As a consequence of acquired hearing impairment (HI) communication difficulties in the form of auditory comprehension frequently exist. Despite significant advances in the hearing technology available to hearing impaired (HI) individuals, hearing devices such as hearing aids and cochlear implants are commonly unable to fully restore normal hearing acuity and/or auditory comprehension. An individual with hearing loss may therefore need to rely more heavily on available visual information to assist message reception, particularly in more difficult listening situations. It has long been recognized that the addition of visual information provided by the mouth, lips and tongue tends to improve overall speech perception and may help to address such residual communication difficulties. Training in the use of such visual cues (known as lip-reading) has frequently featured in aural rehabilitation programs. Aural rehabilitation texts and intervention programs often also make brief mention that HI adults should endeavour to take note of a speaker's gesture while communication partners should utilise gesture while talking. These recommendations, however, do not reflect evidence-based practice and it remains to be determined how and what type of gestures are used in everyday conversations involving HI adults and their conversation partners.

The aim of the current study was to increase understanding of the impact of acquired HI on co-speech gesture during conversational interactions. Conversations between HI adults and their frequent communication partners (FCP) (without significant hearing impairment) were audiovisually recorded while participants performed different conversational tasks. As a comparison recordings were also made between the original FCP and a second CP (also without a significant hearing impairment). The conversations were filmed within comfortable university clinic rooms and the talk transcribed using conversation analytic (CA) style techniques. Transcription and coding of nonverbal behaviour, including co-speech gesture, following guidelines provided by McNeill (1992) and for gaze by Skelt (2006) was conducted followed by intensive qualitative analysis of the conversation samples.

Results from the preliminary analysis provide some initial insights into the influence of HI on the use of co-speech gesture in everyday conversation and how gesture may be used to reduce or resolve communication difficulties involving HI adults. Ultimately it is anticipated results from this study will help to inform aural rehabilitative practice/s including the (conversational) training of familiar communication partners.

Keywords: co, speech gestures, adult acquired hearing impairment, communication partner, conversation analysis, aural rehabilitation

# Depiction and Ception in the discourse of philosophical exposition

Michael Stevens

University of Nottingham Ningbo 199 Taikang East Road Ningbo 315100 China.

This study examines two lectures by a philosopher who works in the thought of Gilles Deleuze, focusing on the way gesture plays a part in the construal of complex or abstract philosophical notions. These lectures were video and audio recorded during two conferences given a month apart, and analyzed using the ELAN annotation software tool. Two examples are taken which show how the lecturer attempts to provide concrete explanations of a characteristically Deleuzian conceptual strategy, that of putting concepts into a 'prism' in order to explode their possibilities. An analysis using Streeck's (2009) exploration of depiction, with reference to Calbris' (2011) observations on the relationship between abstract thought and concrete expression, reveals that the process of exposition involves a series of co-verbal gestures by which meaning of a thematic concept is clarified. The first example observes how a building's 'cinematicity' is explained using a variety of shape drawing, movement, and mimesis. The second example observes how the lecturer explains 'chimeric ontology' by depicting the disintegration-reintegration machine from the movie *The Fly*, using dynamic gestures to reenact the machine's function. Both of these examples are preempted by the lecturer's use of a 'prism' gesture to suggest that the concepts presented are hybrids or re-assemblages, thus the imagistic nature of the examples are given abstract understanding. My discussion of the analysis of the representational gestures, following Calbris (2011) and Streeck (2009), draws on Streeck's distinction between depiction and ception, the idea that certain concepts are themselves construed by gesture in discourse. I argue that while the construction of concepts in these lectures appear to be conscious attempts at illustration, the referral to the abstract philosophical notion engages the repertoire of the lecturer's argumentative strategies, thus operating on the level of thinking by hand. Discourse cohesion is given not only to the individual lecture, but to the philosophical approach of the lecturer, much in the same way that speaker-specific gestures function (Parrill 2007). Observations of these kind of gestural cohesion devices lend to further understanding as to how the theoretical standpoints of academicians are solidified.

Keywords: gesture, philosophy, concept building, philosophical exposition



## Scene-setting and referent introduction in a sign and a spoken language

Beyza Sumer<sup>1,2</sup>

<sup>1</sup> Radboud University Nijmegen (RU) – Netherlands <sup>2</sup> Max Planck Institute for Psycholinguistics (MPI) – Netherlands

Learning to narrate events requires learning to provide adequate background information to the story (Menig-Peterson & McCabe, 1978). One way of doing this is to provide such information at the segment of the narrative discourse that constitutes its start or opening, and to present background information about the events that are about to happen by specifying who, where, when (i.e., scene-setting elements) (Berman & Slobin, 1994; Berman, 2001). Studies with speaking children show that the younger the children are, the less information they provide to set the scene in their narratives (Peterson, 1990; Umiker-Sebeok, 1979; Peterson & McCabe, 1983; Berman, 2001). However, these studies are conducted with children who are required to translate events presented usually in spatial-visual mode (as in the case of picture-story narrations) into sequential segments of verbal output, thus causing a particular kind of cognitive demand (Berman & Slobin, 1994). The aim of the current study is to track the developmental patterns in learning to set the narrative scene and introduce referents in narrations produced by hearing children acquiring Turkish and deaf children acquiring Turkish Sign Language (Türk İşaret Dili, TİD) natively (i.e., from their deaf parents). The data were collected from three age groups in TİD and Turkish: Younger children between 3;5-6;8 years, older children between 7;2-9;11, and adults. There were 10 participants in each age group in each language. The participants were asked to narrate a picture story (Balloon Story, Karmiloff-Smith, 1981) to a deaf or a hearing person depending on the language condition. All the data were annotated and coded by deaf and hearing research assistants for the linguistic elements used to set the scene at the beginning of the narration (i.e., who, where, what information for the first picture) and the use of explicit linguistic forms to introduce the referents (i.e., the boy, the balloon man, the balloon). The results of the analyses showed that TİD-signing and Turkish-speaking children became adult-like in expressing scene setting elements at similar ages: In both languages, older age children, but not younger age children, were similar to adults in how frequently they used different types of scene setting elements. As to referent introduction, even younger children in both languages were adult-like in making explicit referrals (e.g., using lexical signs in TİD and noun phrases in Turkish) to different referents in Balloon Story. Thus, the modality difference between TİD and Turkish does not seem to play a role in the acquisition of narrative skills by signing and speaking children.

Keywords: Language acquisition, sign language, narrative discourse

## Under what circumstances does gesture in instruction exert an effect on learning: The role of gender and context

Koumoutsakis Theodora<sup>1</sup>, R. B. Church<sup>2</sup>, Saba Ayman-Nolley<sup>2</sup>

<sup>1</sup> University of Chicago (UofC) – United States <sup>2</sup> Northeastern Illinois University (NEIU) – United States

According to McNeill (1992), speech and gesture work as an integrated system to convey a message. Do speech and gesture work together when used to teach? Past research shows that a combination of gesture with spoken instruction improves learning for children learning math concepts more than speech instructions without gesture (e.g., Church, Ayman-Nolley & Mahootian, 2004; Singer and Goldin-Meadow, 2005; Cook, Duffy & Fenn, 2013). However, these previous studies have not explicitly examined whether gestures could be more beneficial for one gender than another. Some research indicates that males have an easier time processing spatial imagery than females (Tzuriel & Egozi, 2010). In addition, gestures are particularly good at delivering spatial information (Hostetter, 2011). Therefore, one might expect that males would be more responsive to gesture than females. Thus, our study examined whether speech plus gesture instruction on the math equivalence concept will be more beneficial for males than females. This study used pre-algebraic mathematical problems (e.g.,  $3+4+5= \_\_\_+5$ ) to observe how instruction that incorporates representational gesture interacts with gender. Participants (half male and half female) were 7 to 9 years old. Three videos containing instruction for how to solve these pre-algebraic problems were used: gesture alone, speech alone, and gesture in combination with speech. Each child first completed a mathematical pretest and then was asked to explain how they solved the problems. The child was then randomly assigned to watch one of the three instructional videos. Following the video, the child completed a posttest similar in form to the pretest. No child solved the pretest problems correctly; thus, learning was determined by correct solutions on the posttest for both regular and transfer problems. A child, who was correct on 2 or more regular, in addition to 2 or more transfer problems, was considered a learner.

Preliminary results show that speech plus gesture instruction was the most effective with 75% of children experiencing learning and transfer versus 29% after speech only and 10% after gesture only instruction. One hundred percent of the males exposed to speech plus gesture instruction learned in contrast to only 50% of the females. Interestingly, with respect to gesture only instruction, 20% of the males learned while no females learned. Regarding speech only instruction, 33% females learned compared to 20% males.

The results of the current research further contribute to our understanding speech-plus-gesture integration. If speech and gesture are truly an integrated system, then we would not expect gesture only instruction to benefit learning and it did not. In addition, this research suggests that because of the visuo-spatial nature of gesture, gender differences in cognitive orientations may mediate the role gesture plays in the context of instruction about spatial concepts.

Keywords: mathematical concepts, gestures, learning, gender

# Engaged listening as the natural habitat of talk

Cacilda Vilela, Leland Mccleary

University of Sao Paulo (USP) – Rua do Lago, 717 - Prédio da Diretoria e Administra çao - Cidade Universitaria  
CEP: 05508-080 - Sao Paulo - SP - Brasil, Brazil

With its descriptions of turn-taking practices, conversation analysis has given us a way to understand the local management of speaker exchange in informal verbal interactions. Yet its emphasis on ‘who has the floor’ casts the listener as someone who, until they have managed to take the floor, is limited to a communicative ‘backchannel’, mostly dedicated to minimal vocalizations that signal their continuing status as listeners. While there has always been an understanding that backchanneling is also done non-vocally, the field of gesture studies in general has given relatively little attention to the role of listener bodily action. With its emphasis on manual gestures, it has focused primarily on the speaker role in interactional exchanges. Backchanneling relies only marginally on manual gestures; its richness is to be found in facial displays (including eye and brow movement and gaze direction), head movement, and body posture (Allwood, et al., 2007). The repertoire of recognized functions of backchannel messaging has grown from attention-signaling ‘continuers’ to include acceptance/non-acceptance and emotive/attitudinal markers; and research on listener feedback has recognized its importance in developing and maintaining common ground, as seen for example in speaker cuing for feedback (Bertrand et al., 2007) and the effect of feedback on speaker production (e.g., Holler and Wilkin, 2011; Kuhlen, 2010). Nevertheless, there is still little understanding of the ways in which non-verbal backchannelling might constitute an ongoing substantive contribution to dialogue. Our research attempts to contribute to that understanding, and to the view that in a conversation, “all the time belongs to all the interlocutors” (O’Donnell, et al., 1990) in two ways. With detailed transcriptions of semi-spontaneous conversations, using ELAN and coding schemes for manual gestures, facial expressions (eyebrow, eye lid, mouth), eye gaze, head movement, shoulder movement and body torque continuously for both participants, and paying particular attention to contexts of explicit and implicit negation/non-acceptance, we are able to show, first, how attention to ongoing non-verbal (as well as verbal) feedback shapes the topical development of the conversation. Illustrations include examples of facial and bodily listener reactions to speech that apparently alter the ongoing or subsequent speech. Second, a reinterpretation of the ‘backchannel’ as including any unprofiled commentary on the speech being uttered gives us a way of understanding what might be called speaker backchanneling, in which complex facial and bodily actions contradict or complement what is being said in such a way as to shape current listener’s follow-up turn.

Keywords: engaged listening, facial actions, face, to, face interaction

# Experiences, Attitudes and Skills of Hearing L2/M2 DGS Learners – Making the Acquaintance of Constructed Action

Stella Von Randow

University of Hamburg – Germany

Constructed Action (CA; following the definitions of e.g. Roy 1989, Winston 1991, Liddell 2003, Fischer & Kollien 2006a, 2006b) in its unique position among lexical and gestural areas of sign languages, as a hard to describe and even harder to prescribe, yet impossible to ignore element, poses an immense challenge, but also a treasure to be unearthed in the field of sign language linguistics and didactics. Constructed Action may be acquired or learned in different ways, be it through conscious or unconscious processes as is the case in other linguistic aspects, however, its high level of iconicity and gradience gave reason to some early sign language linguists and teachers alike to feel at unease with it – out of worry, its possibly mime-like structures would pose a danger to the process of acknowledging sign languages as full-fledged languages.

In my time as a student, I noticed that this dilemma of loving sign languages for that very showing quality they had and at the same time carrying around a lot of these insecurities in teachers led to a situation of little linguistic knowledge and conflicting messages surrounding CA, both in the classroom and in literature for teachers and learners alike. I conducted a study with ten students who were right in the middle of learning DGS and got them to talking about CA without them knowing what they were talking about – I decided on naming this topic of our conversations CA/implicit to be concise in my description. By confronting them with specific video stimuli and making them talk about how to best present a speedy, action-filled film sequence – bound to make them think in the direction of CA – and having them talk to each others in pairs, I found that these students were in a fascinating state of limbo between the very poles observable in the literature on the topic as well: They consciously knew little about CA/implicit, but what they said could be read as having acquired, not consciously learned, quite a lot about it by observing their Deaf teachers when signing. They described CA/implicit as a beautiful way to express content, but also made some derogatory statements about gestural expression, e.g. using facial expressions in a way that they deemed to be inappropriate or funny. My talk will shed light on this fascinating set of data, including a look at how language(s) and gesture were used in the filmed sessions, and develop thoughts on how the mistreatment of Constructed Action in sign languages, specifically its didactics, contributes to the re-strengthening of old barriers concerning the constitution of meaning through different means.

Keywords: sign languages, didactics, Constructed Action, L2/M2 learners

# Raising the curtain on gestures: Visibility has no apparent impact.

Jason Wallin, Dare Baldwin

University of Oregon (UO) – 1585 E 13th Ave, Eugene, OR 97403, United States

Are co-speech gestures "for the speaker"-primarily about language planning and production? [1] Or are they communicative and "for the listener?" [2] Studies manipulating mutual visibility offer initial support for a gestures-as-communication account. In about half of these, speakers gesture significantly more to visible listeners than to those over an intercom or invisible behind a screen. [3] However, while mutual visibility does create opportunities for multimodal communication, it might also change the communicative environment in other ways, rendering the empirical findings subject to alternative accounts. Mutual visibility might raise speakers' arousal levels [4] or increase their cognitive load, making speech planning or production more difficult, so that "for the speaker" factors lead to increases in gesturing.

We took a different approach to investigating the question: changing the height of a curtain to affect visibility in stages rather than in an absolute fashion. We positioned chairs on either side of a transparent screen, with an adjustable opaque curtain covering the lower half. Alone or in dyads, 25 undergraduate students sat, talking through a series of tasks, brainstorming lists of items they would want, were they lost in the wilderness. The curtain moved to three different heights between conditions-roughly mid-sternum to just below eye level for average participants. In dyads, then, across all three conditions, this setup held constant mutual eye contact-and ostensibly arousal, cognitive load, etc.-while manipulating how much of a speaker's body was visible to the listener.

If speakers employ gestures communicatively, then, first, increasing curtain height should be associated with concomitant increases in gesture height and, second, these effects should be present for dyads but not lone speakers.

Findings revealed no such effects. A Windows Kinect captured motion from participants during the brainstorming tasks. Local maxima in hand height were segmented from this stream. Mean differences between curtain-height conditions were small (range: 1-7 cm) and quite variable (range of SD: 12.6-17.5 cm). In fact, though not significantly so, hands were highest in the lowest curtain conditions. There were no significant differences between lone speakers and dyads.

These findings suggest that speakers' gestures don't increase in magnitude to accommodate the visual access of interlocutors; perhaps, then, the gestural types common to these tasks are not communicative. Future work should address alternative accounts, including small sample size, difficulty in perspective taking, or gestures particular to these tasks, and investigate the extent to which findings may differ with other types of conversations, such as those that more explicitly refer to space and position like classic referential communication tasks.

Keywords: co, speech gesture, visibility

# Communicating with gestures? Comparing two theories of multimodality to assess the use of gestures accompanying the preposition "around".

Jack Wilson

University of Leeds – Woodhouse Lane ; Leeds ; LS2 9JT, United Kingdom

Since Grice's seminal work on meaning and communication, it has been widely accepted that communicative behaviour does not rest on a process of coding and decoding but rather on an inferential process of intention attribution. Communicative acts involve the attribution of (at least) two layered intentions: (i) an intention to communicate something and (ii) an intention to direct the comprehender to (i) (cf. Sperber and Wilson, 1986). This captures the fact that what we say is often distinct from what we literally mean. However, when the focus is shifted to co-speech gesture, a pragmatic theory focussed on intention struggles to provide a framework for understanding gestural communication. This is due to the fact that while gestural contributions are often communicative, their intentional status is far from certain.

Generally, there have been two distinct theories explaining how gestures communicate. The first argues that gestures are just one element in composite signals and that they are communicative for the same reason as any other element of behaviour is communicative-because it is taken as a sign (Clark, 1996; Enfield, 2009). The second approach states that gestures are communicative because they serve some function beyond communicating (such as helping the communicator think about space) and their communicative function is derived from this proper function (Wilson and Wharton, 2006; Wharton, 2009).

In this paper I focus utterances including the preposition "around" (e.g., "the road goes around the house"). "Around" has been referred to as path specifying and omnidirectional and is considered to be underspecific rather than ambiguous (O'Keefe, 1999; Talmy, 2000; Atlas, 2005). For example, in the sentence above it is not clear whether the road forms a full circle around the house or, if we take it that the does not form a full circle, then it is not clear whether the road sits on the left or the right of the house. Such spatial language is typically underspecified in this way and therefore requires the comprehender to fill in the detail. The examples of utterances including "around" analysed in this paper come from a dialogue task and show that this detail is frequently filled in by co-speech gesture which is temporally concurrent to its lexical affiliate. I will argue that the presence of gesture in this context strongly suggests that it is being used communicatively and therefore provides evidence that a theory of composite signals might more efficiently capture the mechanisms involved in the production and reception of multimodal utterances.

Keywords: Semantics, Pragmatics, co, speech gesture, multimodality, space