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Book of Abstracts



Plenary Speakers

Visible bodily action in the emergence and development of speakers' and signers' languaging

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What is linguistic communication and what is not? Even if we often convey meanings through visible bodily actions, these are rarely considered part of human language. I will present a review of studies on the continuity from actions to gestures to words and signs extending beyond childhood and across cultures, which has been the central research focus of our lab over the past 40 years. This has been a long, and at times troublesome, journey. Especially when, going against more traditional approaches to language, we pioneered the idea that human communication transcends the spoken medium, often exploiting embodied forms such as signs and gestures. Given the presence of gestures across cultures and the existence of languages that are strongly based on overt actions (sign languages), the embodied nature of human communication is hardly questionable.

Initial studies on sign languages (SLs) tended to focus on the discrete, arbitrary and categorical nature of signs, which makes them more like spoken languages, thereby overlooking the pervasive iconic nature of many SL structures and evident similarities between co-speech gestures, silent gestures and signs. Only in the following years several researchers studying different SL's started focusing on highly iconic structures and began considering signs as visible actions or dedicated gestures with linguistic properties. Recently, various studies on SLs highlighted the presence of gestural components, while conversely studies on gestures in children and adults have adopted many strategies for analysis borrowed from SLs.

Research reviewed shows a progression from motor actions to symbolic communication, which is also highlighted in representational strategies used by children from different cultures and using different vocal and signed languages. I want to stress the role of sign language and multimodal communication in the study of language as a form of action. To this scope I will present recent research on how co-verbal gestures have compositional structure and semantic significance and on how highly iconic structures are essential in sign languages. Studying the visible actions of speakers and signers leads to a revision of the traditional dichotomy between linguistic (categorical, invariable, arbitrary) and enacted (gradient, variable, iconic), and to the development of a new approach to embodied language.



Gesture and Power: Religion, Nationalism, and Everyday Performance in Congo.

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In her new book, *Gesture and Power*, Yolanda Covington-Ward examines the everyday embodied practices and performances of the BisiKongo people of the Lower Congo to show how their gestures, dances, and spirituality are critical in mobilizing social and political action. Going beyond seeing gesture as a complement to spoken language, Covington-Ward explores the role of gesture in achieving larger social transformations. Conceiving of the body as the center of analysis, a catalyst for social action, and as a conduit for the social construction of reality, Covington-Ward focuses on specific flash points in the last ninety years of Congo's troubled history, when embodied performance was used to stake political claims, foster dissent, and enforce power. This talk will focus on two separate yet related instances in which embodiment related to spirituality was at the center of struggles for political and social power. In the 1920s Simon Kimbangu started a Christian prophetic movement based on spirit induced trembling, which swept through the Lower Congo, subverting and challenging Belgian colonial authority. More recently, embodied performance has again stoked reform, as nationalist groups such as Bundu dia Kongo advocate for a return to precolonial religious practices and non-Western gestures such as traditional greetings as a basis for re-creating the former Kongo Kingdom in the present. In exploring these embodied expressions of Congolese agency, Covington-Ward provides a framework for understanding how embodied practices transmit social values, identities, and cultural history throughout Africa and the diaspora.



Coordinating minds and social interaction with the body

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The natural home of human language is face-to-face social interaction. In such an environment language is multimodal, meaning we do not just converse by speech but by using a host of visual articulators also. In this talk, I will present a series of studies that provide insight into the role of these visual articulators in the process of coordination during conversation. Using language in social interaction requires coordination on at least two levels: interlocutors need to tailor utterances to their interlocutors' needs and signal mutual understanding and problems therewith, and they need to make their conversational contributions in such a way that allows them to fit in with the normative practices of the conversational turn-taking system. I will present both experimental and corpus studies to shed light on these issues from a perspective that brings together psycholinguistics and the analysis of social interaction. The argument I will make is that the body plays a core role in achieving coordination at both levels—mind and interaction—and that in order to appreciate the full potential of the body in this domain we need to consider manual and non-manual signals (even the subtlest ones), speakers and addressees, and the conversational embedding of multimodal communicative acts. Socializing psycholinguistics in this way may allow us to go further in discovering why the human communication system has evolved as the multimodal system that it is.



Gesture, language and thought

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I will present a theory on how gesture serves as a bridge between language and spatio-motoric thought. I will focus on speech-accompanying “representational gestures”, which include iconic and metaphorical gestures in McNeill’s (1992) sense. I will discuss evidence regarding how language production processes and gesture production processes are inter-related with each other and how gestures reflect spatio-motoric thinking for the purpose of speaking. I will present evidence based on, among other things, iconic gestures depicting motion events, gestures metaphorically representing abstract concepts, iconic gestures during solving spatial problems, and the relationship between iconic gestures and sound symbolic words.



The embodiment of the non-literal: Viewpoint and the bases of meaning in gesture

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Although all thought (and thus all metaphor) is necessarily embodied – it resides in physical neural systems – this embodiment is particularly visible and inescapable in multimodal communication including gesture. In gesture, mental spaces are metaphorically represented by physical spaces; reasoning and causal action sequence are physical motion, and temporal relationships are physical ones. One important added feature of this gestural data is that it is necessarily viewpointed: physical motion of gesture is always relative to the viewpointed body. Gestural meaning is thus systematically rooted in the meaningful relationship of the gesturing body to its deictic field.

The results of this viewpointed structure are even more pervasive than might appear. Metaphoric structures are, like other cognitive structures, generally viewpointed. Some, like many metaphors for time, are obviously about front-back, up-down and other physically viewpointed structures. But even when the source frame is less obviously related to physical viewpoint, it still imposes viewpoint on the target frame. Once again, it is particularly noticeable in gestural data. Not only is there viewpoint in every gesture, that viewpoint relates to meaningful embodied metaphoric construal of the body as a whole, which contributes to the meaning of the multimodal discourse.

Recent work on gesture has extended to an active interest in multimodal constructions – as, for instance, in my own work on English conditional constructions and gesture. Grammarians have not really thought of conditional constructions as semantically viewpointed (though Dancygier and Sweetser 2005 presents evidence of viewpointed semantics). But the gestural structures accompanying them show that this area of abstract grammatical meaning is also manifested in viewpointed metaphoric gesture – as we should expect from our understanding of bodily meaning.





**Special focus -
Anthropology of Gesture -
Keynotes**

Gestures across Africa

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The quest for the recovery of Indigenous Knowledge mainly focuses on technology involved in agriculture and health practices of indigenous people. Nonverbal communicative gestures are a rich well of information on a people's indigenous knowledge that has accounted for the continuity of the people as well as the organization of their society. Ranging from symbols inherent in festive ceremonies such as different New Year's activities among Sidaama people (Fichee Cambalaalla), new yam festivals among Igbo and Twi peoples, to even such thing as funeral dirge among the Babukusu, an understanding of the various communicative symbols offer additional ways to make sense of cultural dynamics. Additionally, the study of nonverbal communicative codes (quotable gestures) as corollary of oral speech requires careful documentation, explication and contextualization. Relative to the linguistics of spoken languages in the continent, the study of nonverbal gestures is barely scratching the surface in Africa. Aside from gestures in use by the sighted, blind people also use quotable gestures. Thus, in the quest for the gestural origin of language a study of the communicative gestures in use by both demography would be of great value. In order to instigate greater participation in gesture studies from scholars on the African continent and promote research on gesture in diverse and understudied social groups, I will be discussing and highlighting some areas of ongoing research for which we seek collaboration. In addition, I will be underscoring the cultural capital inherent in gestured codes of different nations on the continent.



Natural conventions: Gestural diversity and its limits

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Anthropologists, linguists, psychologists, and other scholars of human communication often align with one of two poles: the universalist position that communicative forms and structures are rooted in our species-typical brains and bodies and are thus broadly similar everywhere; or the relativist position that communication is a product of culture and thus varies prismatically from one group to the next. In the case of gesture, neither position is tenable—something the linguist Roman Jakobson noted almost fifty years ago. He alluded instead to a middle ground in which gestures grow out of the “interrelation of naturalness and conventionality.” In this talk, I articulate this middle ground more fully, drawing on my own cross-cultural work in Papua New Guinea and Mexico, as well as on other recent findings. I argue that gestural phenomena such as head shakes and nods, pointing gestures, palm-up gestures, and spatial gestures can be fruitfully understood as “natural conventions.” As such, they exhibit bounded variation; they are not nearly as uniform as universalists might have assumed, but nor are they as variable as relativists could have imagined. I close by highlighting crucial gaps in our current understanding and by echoing Jakobson’s exhortation that gestural diversity and universals “demand a comprehensive and systematic examination.”



Multimodal acts of depiction: gestural productions of hand and mouth in folk definitions of ideophones

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Studies of multimodal language often assume that speech and gesture play complementary roles, with speech providing propositional content and iconic gestures supplying more imagistic, gradient information (McNeill 1992; Goldin-Meadow 2016). However, this division of labour is not set in stone: there are word-like gestures and gesture-like words (Okrent 2002). Here I start from the latter in the form of ideophones, vivid sensory words found in many of the world's languages. As words that are highly gradient, evocative and often iconic, they “belong not only to language but to an expanded conception of gesture” (Nuckolls 2000; cf. Kunene 2001). Ideophones often occur in composite gesture-ideophone utterances (Kita 1997; Dingemanse 2013; Mihas 2013), in which gesture and speech work together to depict sensory imagery. This coupling offers a unique opportunity for a contrastive study of depictive signs across modalities.

Are all ideophones equally likely to come with gestures? What are the iconic affordances of speech and manual gesture? How do signs in gesture-ideophone composite utterances compare in terms of gradience, conventionalisation and linguistic integration? I study these questions in a video corpus of folk definitions of ideophones in Siwu, a Kwa language spoken in Ghana (Dingemanse 2015). Data is coded for semantic domain, aspect (action/state), and formal properties like gradience and cross-speaker consistency. Ideophones for visible percepts (wùrùfùù ‘fluffy’) are more likely to come with iconic gestures than those for audible percepts (gbiim ‘boom’). Also, ideophones for actions (yaa ‘gushing’) are more likely to come with gestures than those for states (kpoo ‘still’).

Ideophones show much more gradience and variance in form than other lexical items like nouns and verbs, pointing to their gesture-like status (Kunene 1965). On the other hand, speakers do converge on basic phonological properties like vowel quality, phonotactic properties and syllabic structure, pointing to their lexicalised nature. The iconic gestures accompanying ideophones show an even larger amount of gradience and also vary quite a bit across speakers, suggesting they are for the most part non-conventionalised depictive movements. There is a subset of composite utterances in which the gestural part is fairly consistent across speakers in terms of handshape, gesture space or method of depiction. Over time, some gesture-ideophone combinations may move towards conventionalisation, a development that opens up the way for the formation of emblematic gestures and ultimately perhaps a loss of motivational transparency.

Composite gesture-ideophone utterances show the utility of a modality-free notion of gesture (Okrent 2002) and reminds us that meaningful signs may occupy intermediate positions on what is often cast as a binary distinction between convention and creativity. When it comes to multimodal acts of depiction, speech and gesture are not loosely aligned and complementary, but tightly coupled and alike in mode of representation.

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Celestial pointing for time reference in Nheengatú narrative (and beyond)

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This study builds on the findings about the indigenous Amazonian language Nheengatú's system for temporal reference, a visual resource which complements a grammar without higher numerals or tense by providing detailed temporal information by pointing at positions along the sun's path in the sky (Floyd 2016). That work was able to put these visual practices in the context of grammatical, linguistic expression; this study follows up by putting this practice in some cross-linguistic and discourse-pragmatic contexts. It will begin by first reviewing the multimodal typology of celestial pointing, reporting on ongoing comparative work in collaboration with Connie De Vos (Floyd & De Vos 2015) which compares similar practices across both spoken and signed languages, such as the Kata Kolok language of Bali (see De Vos 2015). Then it will take a closer look at how Nheengatú celestial pointing operates in narrative discourse in relation to the temporal progression of events in a selection of narratives from a video corpus. After this detailed look at narrative in one language, some general points will be made about how celestial pointing for time reference could play a role in narrative discourse in different languages with similar visual systems for time reference.

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Action matters: Visible representations of kinship in Central and Northern Australia

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Many of us now take it for granted that human interaction is essentially multimodal. As well as speaking or using a sign language, people point, manipulate objects with their hands, and create maps, diagrams and other graphic traces on a range of surfaces. But answers to questions of how cross-modal and ‘polysemiotic’ integration is achieved, when it is preferred, and what communicative ‘systems’ can go together remain more elusive. In this presentation, I explore these questions by focusing on kinship, a key domain long investigated by anthropologists and linguists alike. The examples are drawn from the rich and complex communicative environment of Central and Northern Australia where Indigenous peoples employ various forms of what is locally termed ‘action’ (sign and gesture) alongside speech and drawing practices. I argue that considering these actions, that either accompany speech or replace it, enhances understandings of the terminologies and conceptual structures of kinship and provides an opportunity to move beyond “the anthropology of words” (MacDougall, 1997).

I foreground this discussion by giving a brief overview of these Australian kinship systems. I then discuss three main modes of representation. The conventionalised lexicon of ‘alternate’ sign languages throws light on the underlying features of kinship, as well as providing visible instantiations of embodied forms of social interaction (Kendon, 1988; Green, Bauer, Gaby & Ellis, in press). Co-speech gestures that accompany spoken kin terms illuminate aspects of their meanings that are not apparent if we consider speech alone (Enfield, 2005, 2009). Finally, yet another perspective is provided by semi-permanent and ephemeral graphic representations of kinship found in dynamic narrative practices such as sand drawing (Green, 2014), children’s games about kin (Ellis, Green & Kral, 2017), and in the repertoires of desert artists. A comparison of these modes of representation, and the ways they work together, provides an opportunity to examine cross-modal interaction and diversity in a domain of core cultural salience.



Talking with the face only: multifunctional gaze in speech and sign in highland Chiapas

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In the first-generation sign language, dubbed Z, developing in a single extended family including three deaf siblings in a rural indigenous village in Chiapas, Mexico, gaze is central to the morphology of a variety of grammatical devices, serving aspects of utterance construction ranging from reference and argument structure to clause parsing, turn selection, and reciprocity (see [1-2]), as it does in other sign languages (see, for example, [3-6]). Indeed, hearing members of this tiny signing community say that the deaf individuals, in conversation with one another, sometimes choose to “talk with their faces only”—that is, using minimal manual signs—as a kind of “whispering” or secretive style of communicating when, for example, they wish to avoid eavesdropping.

One highly likely source of inspiration and raw material for the Z sign language is gesture—that is, visible aspects of the utterances of speakers—in the surrounding Tzotzil(Mayan)-speaking community. How, exactly, such visible elements of spoken communication are incorporated into the emerging sign language (as they demonstrably are [1]) and adapted to and by it are issues of considerable import and debate in understanding how a young sign language grows and develops. Investigations of such processes of cross-modal language borrowing, grammaticalization, and change are also crucial to understanding the multiple semiotic underpinnings of language writ large.

Research has been conducted into various aspects of Tzotzil speakers’ gestures, especially their indexical and iconic links to the spoken word (for example [8-14]). At the same time, the roles of gaze and the eyes among the visual elements of spoken utterances have in general been the object of sparse attention (but see [15-24]), especially in the case of Tzotzil and other Mayan speaking communities. This study presents a close comparison of the communicative use of gaze in Z signing as opposed to comparable spoken interactions in the surrounding Tzotzil-speaking community, to theorize differences both in frequency and apparent import of gaze-linked semiotic elements among linguistic systems centered on different perceptual (and corporeal) modalities.

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Yucatec Maya multimodal interaction as a proto Yucatec Maya Sign Language

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This paper aims at showing, through qualitative examples, that Yucatec Maya communication is systematical (with numerous formal non-verbal strategies in everyday interactions) and semantically rich, through the use of many iconic and quotable gestures and of character perspective and, that all these strategies come to complement oral communication. Because of this extensive and systematic use of the non-verbal channel, if confronted to a situation in which they can use speech, Yucatec Maya speakers have generally no trouble communicating. This is why, we argue, it has been so easy for hearing and their deaf kin “to invent” signed languages and also the reason why these newly created sign languages look so similar to one another although spread in different villages in the Yucatec peninsula.

Recently many emerging sign languages have been studied and put to light in the research field (Meir et al. 2010, Zeshan & de Vos. 2012). However, and although this is a tremendous development, the fact remains that there are numerous of emerging sign languages are still unidentified. In the Yucatec peninsula one village (Chicán) is particularly known and has been described as “the” Yucatec Maya Sign Language village or sometimes “Chicán Sign Language” (de Vos & Pfau, 2015; Escobedo Delgado, 2012; Johnson, 1991; Shuman, 1980; Shuman & Cherry-Shuman, 1981). However, and despite the fact that many of these authors were aware of the existence of other sign languages in the same region, almost nobody seriously tackled the issue of comparison. Such position is obviously problematic and the aim of this talk is to discuss this issue considering that multimodal Yucatec Maya communication is a proto-Yucatec Maya Sign Language, which allows fruitful and productive comparison between multimodal communication and sign language but also for comparing the different sign languages used in the peninsula.

This talk will be structured as follow: First, we will consider examples of YM conversations in which gesture are indispensable complement of speech in several ways. Second, we will consider several paths of recruitment and lexicalization of gestures into signs: how quotable gestures get transformed into lexicon, holophrastic gestures into grammatical signs through a process of desmantization; how transfers of iconicity and semi-conventionalized gestures give rise to new signs, similar in structure but different in form; how manual classifiers and SASS are already present in gesture and get integrated in YMSL; how character perspective is already present in YM; and finally we will consider a few transfer of cultural concepts and linguistic calques from YM to YMSL.

A key conclusion of this talk is to point out the importance of taking into account the cultural context and the role of bilingual bimodal signers in the emergence process of new sign languages.

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The total gestural fact? Gesture in Anthropology and the Anthropology of Gesture

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For gesture researchers outside anthropology, the promise--and challenge--of anthropological method stems from one or more of its core commitments: its pursuit of human variation, both diachronic and synchronic; its insistence on naturalistic rather than experimental research design; and its integrative sensibility that studies human behavior in an expansive sociocultural “context.” This last sensibility may even lead some to try to chase down the “total gestural fact,” to twist a term of Marcel Mauss. Mauss famously saw gift exchange as a nexus—a “total social fact”—in which “all kinds of institutions are given expression at one and the same time.”

But as we imagine what an “anthropology of gesture” can offer the wealth of gesture literature based largely in linguistics and cognitive science, we should pause and reflect critically on the fitful history of gesture in this field. I begin by revisiting two notable—but neglected—anthropological voices from twentieth-century gesture research in the United States: David Efron, a student of Franz Boas, who conducted an imaginative, fine-grained study of gesture variation in New York City; and Ray Birdwhistell, whose ambitious postwar science of “kinesics” teamed film-based microanalysis with American structuralism.

Efron and Birdwhistell saw gesture very differently. At stake in their work, and ours, is the fundamental problem of how and with what effects a science of gesture delimits its object of knowledge. What anthropologies of gesture are opened up and foreclosed when we delimit gesture one way rather than another? If “anthropology” is to mean more than simply comparison and group-relative variation; if it is to mean a richly contextualized perspective on gestural semiotics, then what would such an anthropology require? Must we return, in effect, to an old sense of “gesture” that refused to separate out articulators like the hands and thought of gesture configurationally as ‘bearing’ and ‘comportment’? If, instead, we insist on the rigorous empirical study of handshape and movement pattern, through what additional, mediational concepts and methods can gesture become a window onto sociocultural life if not a total gestural fact?



On ethnic sign languages and shared gesture repertoires in Africa

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The African continent hosts a multitude of sign language (SL) types. In addition to SLs that evolved around deaf schools (locally -as e.g. in Guinea Bissau (Martini & Morgado 2008) and Mauritius (Gébert & Adone 2006) or abroad) and in so-called ‘deaf villages’, we find a third category of SLs that evolved outside the context of deaf education or of a local peak in the incidence of deafness. Their labels typically refer to an ethnic/linguistic group (*cf. Hausa SL* (Schmaling 2000), *Yoruba SL* (Orie 2013), *Bura SL* (Blench & Warren 2006)), or to an area or urban centre (*cf. M’bour* (Jirou 2001)). Similar cases found outside Africa include *Yucatec Maya SLs* (Le Guen 2012) and *Inuit SL* (Schuit 2014).

Several independently evolved (West) African SLs resemble each other in lexicon or structure in a way that is unexpected. Thus, four locally evolved West African SLs are found to use the cross-linguistically unusual system of body-part size and shape specifiers (Nyst 2016). This structural overlap across SLs follows from overlap in the gestural systems surrounding them, which are all found to use gestural equivalents of the body-part size and shape specifiers. In addition, surprising lexical similarities are attested across unrelated sign languages. In the virtual absence of documentation and description of gestural systems in Africa, vital questions about the relation between SLs and their gestural environment, as well as between SLs themselves, cannot be answered at present.

It is an empirical question, how wide the knowledge of these SLs actually spreads and to what extent it coincides with the gesture system of the hearing members of the particular ethnic group. It also is a question whether the hearing gestures are indeed widely used or confined to a particular group. Very few studies focus on West African gestures. A notable exception is Sorin-Barreteau (1996) who presents a repertoire of around 500 gestures for the Mofu-Gudur in Northern Cameroon. In addition, observations on gestures, postures and bodily behavior can occasionally be retrieved from historical and anthropological studies, as well as from studies on dance, narrative and plastic arts.

In the remainder of my talk, I will triangulate the analysis of gesture repertoires (incl. Hohegger 1978 and Brookes 2004) and descriptions of gesture use in other studies with the results of a preliminary analysis of an incremental database project documenting conventional gestures in Africa (GestuRA). I will conclude with a discussion of the implications of shared gesture repertoires for sign language emergence, typology and the agenda of gesture research.

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Communicative ‘culture’ in great ape gesturing

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Scientific interest in the diversity of gestural signalling dates back to the figure of Charles Darwin. More than a hundred years later, there is a considerable body of work on human gestural diversity, while the question of communicative ‘culture’ in our closest living relatives, the nonhuman primates, is relatively unexplored.

Here, we will stir new interest into this topic by (i) reviewing the state of the art, and (ii) presenting new data on gestural diversity and usage in three different chimpanzee (*Pan troglodytes verus*; *Pan troglodytes schweinfurthii*; *Pan troglodytes troglodytes*) subspecies, two long-term study sites (Kanyawara community, Kibale National Park, Uganda, and Taï South community, Taï National Park, Ivory Coast), and one newly habituated community (Rekambo community, Loango National Park, Gabon). We will summarize findings on well-established behaviours differing in their form (GROOMING-HAND-CLASP), and/or meaning across populations (LEAF-CLIPPING; DIRECTED SCRATCHES). In addition, we will report on three dyad-specific gestures (SHAKE BACK, TURN BIPEDAL, REAR UP), one population specific gesture (TEAR LEAF), and the role of interactional experience and social exposure on gestural diversity and acquisition. We suggest that social negotiation plays a crucial role in enabling communicative interactions and transmitting information, and argue that the impact of social learning on communicative patterns—and thereby possibly communicative culture—has strongly been underestimated in great ape communication. We conclude with a brief set of empirical desiderata for instigating more research into this intriguing research domain.





Panels

Panel:

Analyzing gesture movement quality in relation to aspectuality across languages: Video coding, a kinesiological approach, and motion capture

Panel chair: Alan Cienki^{1 2}

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The present project concerns the ways in which the temporal contour of events is, and is not, expressed in the linguistic forms of verb tense and aspect and in the movement quality of co-verbal gestures. Several previous studies have shown specific connections between aspectual categories and gesture movement qualities (e.g., Duncan 2002; McNeill 2003; Parrill *et al.* 2013). The current project originates from an extension of the Becker *et al.* (2011) study on differences in characteristics of speakers' gestures in relation to the semantic aspectual categories of verbs that they co-occurred with.

The three languages involved in this study (French, German, and Russian) afford speakers with different systems for characterizing events in the past. Russian has only one past tense form but two grammatical aspect forms (imperfective and perfective). French and German each have a one-word 'imperfect' past tense (*imparfait/Präteritum*) and a compound 'perfect' tense, which have been argued to constitute a semantically aspectual distinction in each language. Yet, the tense distinction is used differently in these two languages in their spoken form, with the perfect tense in German having become more of a default past tense with most verbs.

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. Building on Müller (1998, 2000) and Boutet (2010), we hypothesized correlations between "bounded" gestures (with a pulse of effort) overlapping with perfect past tense/aspect verb forms, and "unbounded" gestures (lacking such a pulse, having more controlled movement) with imperfect(ive) past verb forms.

On the one hand, the panel will present research findings from the project which relate gesture analysis to the study of language typology and cognition. The first two talks present our cross-linguistic results. Rather than supporting a consistent picture of grammar as multimodal, the results provide insight into the complexity of the relations between spoken language and gesture, for which grammatical features and lexical semantics provide only some of the answers as to how language use is variably multimodal.

On the other hand, the panel will introduce new methodological and technological approaches to gesture research which could be of use to others in the field. Important among these is a kinesiological approach, presented in the third talk. This is a novel approach to gesture studies that takes movement into account in terms of the bodily basis of its production. The relevant categories of bio-physical movement present a different perspective for gesture research than the traditional parameters used for gesture form analysis; whereas looking at handshape, palm orientation, location in gesture space, and movement description involves an external point of view on gestures as they are seen, the kinesiological approach derives from an internal frame of reference, concerning how the body creates gestures.



The kinesiological approach provides a bridge from video coding of gesture movement qualities to the analysis of gestural movement via motion capture. In the fourth talk, we introduce use of the Perception Neuron motion capture system into gesture research. Unlike marker-based mocap systems which record via external cameras, this system takes its data from 32 inertial measurement units – each containing a magnetometer, an accelerometer, and a gyroscope – attached to the body and wired to a computer. The panel will indicate how the pipeline being developed will render motion capture data in a more easily interpretable form, not only in the next stage of this particular project, but also for others, as the pipeline will be made available in the future to anyone interested.

The panel consists of four talks:

- 1) “Gesture movement quality, verb tense, and aspect across three languages: L1 and L2”
-- An introduction to some of the main studies in the project, based on visual analysis of the video data, with results from first and second language production.
- 2) “Grammatical aspect, tense, verb semantics, and gestures in Russian, French, and German”
-- An in-depth analysis of some of the results, showing some complex links between gesture use in relation to the grammatical categories in question and verb semantics.
- 3) “A kinesiological approach to boundary schemas”
-- A different take on one of the main analytical tools in the video coding, so-called boundary schemas, viewed from the physiology of gesture production.
- 4) “A pipeline for motion capture recording and analysis of movement data using an intrinsic frame of reference”
-- A look at how the digital data obtained from inertial measurement units can be cleaned, transformed into another frame of reference, visualized, etc. for analysis in its own right, and for comparison with visual coding performed with video recordings of the mocap sessions.



Gesture movement quality, verb tense, and aspect across three languages: L1 and L2

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Linguists from various traditions have proposed that verbs in the perfect(ive) tense/aspect characterize events as bounded in some way, as opposed to verbs in the imperfect(ive), which either characterize them as unbounded or do not specify boundedness. We hypothesized a correlation of boundedness in gesture (involving a pulse of effort) with overlapping use of a perfect tense or perfective aspect verb in each of French, German, and Russian, and, conversely, unboundedness (smooth movement lacking such a pulse) with the imperfect(ive) verb forms. This talk will present some main findings of the international project that is the starting point of the theme panel.

In study A, personal narratives were elicited from ten pairs of native speakers of each of French, German, and Russian. Verbs were annotated for each of the perfect(ive) and imperfect(ive) past tense and aspect forms along with any overlapping gesture preparations and/or strokes. The boundedness hypothesis above was supported in French, but not for German and Russian, where a significantly greater amount of bounded gestures was used with the two targeted verb forms in each language.

A follow-up, study B, for French and Russian, replicated the one above with five new dyads for each language, and with each participant wearing a Perception Neuron motion capture (mocap) system. Analysis of the video recordings yielded the same results as in study A, supporting the validity of data obtained while wearing this mocap system.

Follow-up study C involved French, German, and Russian university students who were advanced level speakers of one of the other languages as a foreign language (L2). While most of the groups were found to carry over the previously found dominant pattern of gesture movement quality from their L1, native speakers of German and Russian using French as L2, used a statistically equal amount of bounded and unbounded gestures with the French imperfect tense.

This apparent unbounding of the L1 speakers' gestures with the imperfect tense in French as L2 was tested in a replication study (D) involving the same Russian L1 speakers from study B who were all advanced-level students of French as L2. There was significantly greater use of bounded than unbounded gestures with both French tenses. However, the low effect size ($\phi=.2$) of their results with the French imperfect also placed them between the French L1 results (more unbounded with imperfect, $\phi=.5$) and their own Russian L1 results (more bounded with perfective, $\phi=.8$).

The results will be discussed in light of Slobin's (1987) "thinking for speaking" hypothesis in relation to event construal in L1 and L2 and in relation to the next step of analyzing gestural "boundedness" in terms of velocity and acceleration from the mocap data.



Grammatical aspect, tense, verb semantics, and gestures in Russian, French, and German

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This study is part of a project comparing three languages with key structural differences in how aspect is expressed and in how it interrelates with verb semantics. We aim to shed light on how the expression of events in different grammatical forms may relate to different gesture movement qualities. Our data consisted of conversations between pairs of Russian, French, and German speakers (ten pairs per language) -- personal narratives about events they experienced or witnessed. Building on Müller (1998) and Boutet (2010), we hypothesized correlations between “bounded” gestures (with a pulse of effort) overlapping with perfect past tense/aspect verb forms, and “unbounded” gestures with imperfect(ive) past verb forms. In the project, the hypothesis was confirmed for French, but in the two other languages, bounded gestures were used significantly more frequently than unbounded, regardless of the verb tense/aspect.

This follow-up study tests our hypothesis against a sub-category of gestures which represent semantic features of the verbs they overlapped with in time (“verb-representational” gestures), in contrast to a category of “other” gestures, consisting of discourse-structuring gesture, pragmatic gestures, and gestures which depicted elements other than the verb meaning.

The results show that for Russian, our hypothesis was confirmed for the verb-representational gestures, but not for the “other” gestures: the pattern of boundedness versus unboundedness in gesture relating to perfectivity versus imperfectivity, respectively, was confirmed for gestures related to verb semantics. This broke with the dominant pattern found in the language of more bounded gestures being used overall. The findings will be related to the integral link between the aspectual system in Russian and verb semantics (Maslov 2004).

For the French data, gesture use with verb-representational gestures correlated with our hypothesis for both the imperfect (*imparfait*) and perfect (*passé composé*) tenses. For “other” gestures, their use with the imperfect tense correlated with the hypothesis, but not their use with the perfect tense, where there was no significant difference. The German data showed the dominant pattern found in the project for that language, with more bounded gestures being used regardless of the verb tense. But with the imperfect (*Präteritum*) tense, there was another exception with use of the “other” gestures, in that there was no statistically significant difference in gesture type.

In sum, “other” (non-verb-representational) gestures with the French perfect and the German imperfect, being more frequently unbounded than bounded, broke with the overall dominant pattern found previously in each language. The verbs in question tended to be stance-taking verbs in French, and modal verbs and the copula in German. The findings will be discussed in light of debates about the relation of gesture to conceptualization, and to what degree that is shaped by grammatical linguistic categories versus lexical semantics.



A kinesiological approach to boundary schemas

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When a sudden change of velocity appears during a gesture, the quality of the movement is seen as involving a pulse of effort, called “bounded” in previous research [1,2]; with controlled movement lacking such a pulse of effort, we have “unbounded” movements. In a cross-linguistic study of verb tense, aspect, and gesture [1,2], these gesture types provided the starting point for investigating possible correlations between grammatical and gestural categories. What is the basis for the production of a pulse of movement in gesture? This contribution offers a physiologically-based, kinesiological account of the property of being bounded or not in terms of gesture movement quality.

A pulse of effort is based upon kinematic features such as acceleration or deceleration, [3,4]. When the amplitude of a gesture is reduced to the movement of one segment (e.g. the hand), the gesture seems to be bounded because of the acceleration or deceleration we see, due to the short duration of the gesture. How is one to be sure of boundedness, as a gesture coding category, when the amplitude and the duration of the movements are affected by our perception? Beyond the visual effects of kinematics features, we would like to present a kinesiological level of structuring and, beyond that, claim that kinesiology could be the cause of these kinematic differences.

Viewed in kinesiological terms, a movement depends on the segment on which it appears (arm, forearm, hand...). Laws of movements (isochrony [5,6], opposition of phase [7], the law of power $2/3$ [8] and Codman’s paradox [9,10]) explain some of the differences we encounter. We make the assumption that the flow of propagation of the movement [1,2,11] along the upper limb explains the judgment of boundedness in gestures. We consider two directions of flow: the distal-proximal one, for which the movement is initiated on a distal segment (hand) and propagates to a more proximal segment (forearm, arm), and the proximal-distal one, for which the order of the movement begins on a proximal segment and finishes on a more distal segment.

We coded the flows and the segments involved in gestures for four videos of conversational narratives in French (8 participants in total). Our results show that the distal-proximal flow corresponds to gestures coded as “bounded”, and the proximal-distal flow – to the unbounded gestures. Our coding explains the kinematic consequences of these flows. Comparing the boundedness and the flow of co-speech gestures, the results show a strong correlation of differences in movement quality of gestures used with two different past tenses in French that express an aspectual distinction, namely the imperfect tense (*imparfait*) which is associated with proximal-distal flow (81%) and the perfect tense (*passé composé*), associated with distal-proximal flow (74%).

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A pipeline for motion capture recording and analysis of movement data using an intrinsic frame of reference

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Goldin-Meadow & Brentari (2015) highlighted the analysis of movement through motion capture systems (mocap) as a promising means to study the quality of movement with good accuracy. Malaia & Wilbur (2012) have conducted such research, analyzing the difference between telic and atelic verbs in ASL. In the project discussed in this panel, the hypothesis concerning the boundedness of gestures or not, associated with the expression of perfectivity versus imperfectivity, respectively, was supported for French, but not for the two other languages in the study (German and Russian). The German and Russian speakers employed many more bounded gestures than the French speakers did, and more bounded gestures with both verb types studied (perfect[ive] and imperfect[ive]). Preliminary results of another manner of coding, according to the propagation of movement along the upper limb, give even better results for French than those we have with visual coding of the pulse of effort (Boutet *et al.* 2016). The kinesiological manner of coding explores the flow of propagation of the movement. Taking into account the flow could move beyond the visual quality of boundedness, overrepresented in German and Russian gestures, to reach a kinesiological source directly for the expression of perfectivity. We distinguish a proximal-distal flow for which the movement goes toward a distal segment (e.g. hand, fingers), which we hypothesize is more likely to express perfectivity, and the distal-proximal flow, which is expected to match more frequently with verbs in the imperfect(ive) form.

This talk will present two kinds of results: (i) A pipeline of the framework to record, visualize and analyze a multimodal corpus, including audio, video and mocap data; and (ii) measurement of the flow of the movement, with a mocap device consisting of Inertial Measurement Units (IMUs).

The pipeline, made for linguists, is conceived in terms of methodological guidelines. The hardware and the open-source software used will be listed. These guidelines begin before the recording step, presenting the conditions of the environment, the precautions that must be taken into account for the alignment of the three modes of recording (audio, video and mocap); and the naming of the files which must contain, for example, the gender and the height of the subject to visualize the body with a proper virtual skeleton after the recording. The way to visualize the mocap and its inclusion along with video data – in order to check the correspondence between the mocap data and the video – will be explained. Beyond the first results of our project presented here, these guidelines and the open-source software used are being created to help members of any project which uses mocap in gesture studies.

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Panel: Changes in gestural representation during early and late language development

Panel chair: Jean-Marc Colletta¹

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Panel discussant: Gale Stam²

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It is well established today that gesture in everyday talk serves several functions among which are the representation of concrete objects, persons, events and places as well as the introduction and figuration of abstract concepts (logical relations, abstract entities, properties and processes), thanks to their semiotic properties (Calbris, 2011, Streeck, 2009). Yet how do representational gesture for communication evolve in children? Do they index change in language, cognitive and social development, and if so, what kind of change? The panel addresses these questions investigating the production and comprehension of representational gestures (hereafter “RGs”) at both early and later stages of the child’s development.

From past investigations on gesture and their relation to speech in young children, we know that the first attempts to represent referents via bodily movements occur during the second year, notably in the context of naming objects and actions (Capone & McGregor, 2004). The young child produces RGs either in isolation or in bimodal word-gesture utterance to express meanings, and the production of RGs – together with that of pointing gestures – seems tightly related to early lexicon and syntax acquisition. Yet, the study of the young child’s RGs reveals strong variation in their formal features across age and individuals which should be considered more closely.

The first presentation “*Representational strategies in children’s gestures and signs*” by Capirci, Di Renzo, Proietti & Volterra questions the validity and generality of the taxonomy that identifies four representational strategies in young children’s RGs (i.e. “own body”, “hand-as-hand”, “hand-as-object”, “size-and-shape”) by comparing formational parameters and the representational strategies in gesture and in sign production in hearing children and deaf signing children engaged in a picture naming task. Using another set of data filmed in the same kind of context, the second presentation “*A developmental investigation on early representational gestures across Bantu and Romance languages*” by Brookes, Colletta & Capirci focuses on variation across children as regards both preferred gestured lexical targets and morphological features in execution of the corresponding RGs’, and questions the source of variation.

As they grow older (from 3-4 years on), children go on producing RGs while speaking. From studies on multimodal narrative performance, we know that gesture production correlates with linguistic production (Colletta *et al.*, 2010), and that as they grow older, narrators produce more gestures, RGs included (Reig Alamillo *et al.*, 2013). However there seems to be differences between young narrators, their older pairs and adults in the way events and characters are depicted in gesture (Capirci *et al.*, 2011). The third presentation “*Development of representational gestures in Sesotho speaking children’s narratives*” by Agyepong, Mahura, Nteso & Brookes compares RGs produced by Sesotho speaking children to those produced by



adults, all engaged in an elicited narrative task, and show that the main difference lies in the amount of information participants express in one single gesture as well as in their chaining. They discuss their results in light of similar work in other languages.

Similar to the study of children's narratives, studies on multimodal explanatory behaviour show that children's use of gestures of the abstract increases with age (Colletta & Pellenq, 2009). But how do children process RGs that bear metaphoric properties? The fourth presentation "*An experimental study of metaphoric co-speech gestures across age groups*" by Ali Hadian Cefidekhanie addresses this question using an experimental design where children and adults have to attribute meaning to RGs and relate them to verbs and sentences expressing concrete or abstract meanings in congruent vs. non-congruent conditions. The results show an effect of age as well as an effect of previous exposure to abstractedness expressed in gesture and/or speech.

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Representational strategies in children's gestures and signs

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In recent research, considerable efforts are being spent in attempting to consider together representational techniques in the manual modality described by different traditions of studies: from symbolic gestures to co-speech and silent gestures in children and adult spontaneous communication, to signs in Sign Language research. A central question towards a unified taxonomy is to clarify whether during gesture execution the body/hands represent real actions in the physical world (i.e., how an action is performed or how an object is held/used) or something other (the object itself or its size/shape). Four main representational strategies have been described in the literature with different labels: Own body, Hand-as-hand, Hand-as-object, size-and-shape.

A recent study by Marentette and colleagues (2016) comparing spoken and gestural productions of 2-year-old Italian and Canadian children, showed that the two groups produced a similar range of representational techniques. Capirci, *et al.* (2011) examining the development of co-speech gestures in four- to ten-year-olds' narratives, found that hand-as-hand was the most used strategy by all children, but older children produced more hand-as-object with respect to younger ones.

Brentari *et al.* (2015) comparing data across two cultures (American and Italian) and four languages (Italian, Italian Sign Language, English, American Sign Language) found that, signers and gesturers (both adults and children) were more likely to represent agentive situations (i.e., people acting on objects) using handling strategies (i.e., hand-as-hand) rather than entity strategies (i.e., hand-as-object). Similarly, Padden, *et al.* (2015) showed that the particular distribution of representational techniques can vary by context.

The aim of this study is to compare formational parameters and the representational strategies in gesture and in sign production in hearing children and deaf signing children, using the same picture naming task (i.e. PinG) and the same taxonomy, in order to address the following questions: are the strategy of gestures/signs similar/consistent within the hearing children group and within the deaf signing group? Are forms taken by gestures similar to those taken by signs?

The PinG test was administered to 41 Italian hearing children and 12 Italian deaf children (age range 25-57 months). Five pictures depicting objects and five pictures depicting actions were chosen for more detailed analysis and each sign/gesture was analyzed in terms of handshapes, locations, type and direction of movement and the four types of representational strategies.

Results show a high consistency in the form of gestures/signs produced by hearing and by deaf children. Furthermore, all four representational strategies (observed both in gestural studies and in sign research) appear to be already present in representational gestures of hearing children.

These findings support continuity between co-speech gestures produced by hearing children and early signs produced by children exposed to a sign language (Volterra *et al.* 2017).



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A developmental investigation on early representational gestures across Bantu and Romance languages

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The study we report on explores the relation between early lexical abilities and spontaneous representational gesture production using a picture-naming task. It is well established from previous studies (Stefanini *et al.*, 2009; Pettenati, Stefanini & Volterra, 2009) that young children asked to name objects, actions or properties spontaneously produce pointing and iconic gestures during the task, and that gesture production decreases with age as well as with higher lexical performance (Stefanini *et al.*, 2009), thus bringing evidence for gesture production to foster early lexical abilities. In such contexts, children use iconic gestures preferably to represent actions rather than static objects (Pettenati, Stefanini & Volterra, 2009; Pettenati *et al.*, 2012), and their gestures present a high degree of similarity in their semiotics and morphology when aiming at representing a certain referent, thanks to its specific features (Marenttete *et al.*, 2016).

What remains unclear from these studies is, first, whether and how the young child's gestural means for representation purpose change over age as regards representational strategy and morphological features. To detect similar changes in representational strategy and/or morphological execution of gestures in children speaking distinct languages would plead for a universal developmental trend linking knowledge of object/action via sensory-motoric experience, conceptual development, and lexicon acquisition. Second, there aren't any conclusive results so far as to what extent the belonging to a certain language-culture affects the young child's iconic gesture production, despite the finding that children from different languages/cultures do not always gesture for the same lexical targets when naming it, and sometimes do gesture for easy lexical targets in their own language.

In order to address these two issues, we compared iconic gesture production in children speaking a romance language (Italian or French) to that of children speaking a Bantu language spoken in South Africa (Sesotho). 108 children distributed across language groups and in three age groups (25/30/36 months) were administered a naming task using the lexical assessment tool Parole in Gioco (PinG). PinG was created in Italy for Italian children and, for the purpose of the study, was adapted to two languages (French and Sesotho). In our paper, we present: 1. Results on overall lexical performance, iconic gesture production and preferred representational strategies; 2. Results and discussion out of the detailed morphological analysis across age groups of the most frequent iconic gestures that were produced (e.g., combing, washing, pushing); 3. Discussion based on linguistic and cultural differences in representational strategies and preferred gestured targets.



Development of representational gestures in Sesotho speaking children's narratives

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This study focuses on the development of representational gestures in later childhood in narrative discourse in Sesotho, a Bantu language. Previous studies show that gesture and speech develop together and change as children acquire new cognitive and discourse abilities (Colletta *et al.* 2015). Common development trends across language groups (American English, French and Italian) (Colletta *et al.* 2015) and between Zulu and French (Kunene *et al.* 2016) show that with age more detailed and complex narratives develop with more gestures and a great variety of gestures. There are also developmental differences in the shape and meaning of representational gestures in later childhood (Graziano 2009). In this presentation, we explore whether Sesotho speakers follow a similar pattern in the production of narrative discourse and gesture and how representational gestures change with age. We analyzed narratives produced by Sesotho speaking children aged 5-6 years (N=10), 9-10 years (N=10) and adults (N=10), who watched a wordless cartoon (originally used by Colletta *et al.* 2015), and narrated the story back to an interlocutor. Our results show that narratives become longer between 5 and 10 years of age. The proportion of narrative clauses decreases with age but the difference is not significant. The proportion of representational gestures versus other types remains similar across age groups. The rate of gestures per clause and the rate of representational gestures significantly increases with age. Comparing the development of representational gestures with age, we selected macro-episodes in the narrative where all age groups used higher numbers of representational gestures. We divided these macro-episodes into micro-episodes according to the sequence of events in the narrative. We then compared representational gestures in these micro-episodes across the three age groups. We found that adults depicted multiple elements of each micro-episode in their gestures. The number of elements depicted in a gesture increased with age with the youngest group of children depicting only one or two elements. We demonstrate these differences with examples from different age groups across the same macro-episodes. We discuss and compare these results in relation to previous studies.

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An experimental study of metaphoric co-speech gestures across age groups

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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 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.

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Panel: Gestural diversity and gestural typology

Panel chairs: Kensy Cooperrider¹ and Olivier Le Guen²

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Recent research has brought to light striking diversity in how people gesture across communities (Kita, 2009). Variation has now been documented in emblems and pointing gestures; in gestures depicting size, shape, motion, placement, and spatial relationships; in metaphorical gestures representing time, kinship, and other abstract concepts; in the pragmatics of gesture use; and in many other aspects of gesture in communication and cognition. Alongside this evidence of variation, there is also compelling evidence of widespread patterns in gesture use across cultures. Yet, at present, there is no recognized subfield of “gestural typology” devoted to the systematic study of gestural diversity and universals. Good models for such a subfield exist. The typological study of human language is at least half a century old (Greenberg, 1968; Croft, 2002), with recent expansion in the areas of semantic typology (e.g., Evans, 2010) and sign language typology (e.g. Zeshan, 2004).

The proposed panel aims to plant the seeds of a new subfield of “gestural typology” by showcasing typologically informed and informative work on gesture. The assembled research spans eight non-European speech communities in different regions—Latin America (Floyd, Le Guen), Africa (Krajcik, Nyst), Southeast Asia (Gawne), Australia (Green), and Melanesia (Bressem, Cooperrider)—and examines a wide swath of gestural phenomena, including pointing, spatial gestures (size, shape, placement), and gestural negation, among others. The eight presentations will highlight the promise and challenges of gestural typology in different ways. Some talks will provide a “typological sketch” of gesture in their community of study, many will explore the typological implications of particular phenomena of interest, and several will take on conceptual and methodological considerations. Together, these contributions will make a strong and spirited case that the subfield of gestural typology is not only possible and promising, but also urgently needed.

Crystallizing a subfield of gestural typology would contribute to our understanding of gesture—and, more broadly, of human communication and cognition—in several key ways: *First*, it would promote deeper understanding of gesture and of what factors motivate gestural patterns. Researchers often seek to explain what motivates a gestural phenomenon in a given community, appealing variously to cultural practices, links to spoken language, or universal cognitive tendencies. But without putting the phenomenon of interest in broader typological perspective, such explanations risk over- or under-generalization (e.g., Haspelmath, 1997). *Second*, it would spur further research on gestural diversity by highlighting gaps in current knowledge, whether gaps in our understanding of a particular community, a geographic region, or some overlooked dimension of gestural variation. *Third*, it would give rise to new formats for reporting observations about gesture, such as the “typological sketch” (exemplified in the panel). Such a format creates space for observations about phenomena that might not merit standalone publication, but which are nonetheless valuable contributions to our understanding of broader typological patterns.



Fourth, it would inform our understanding of related communicative and cognitive phenomena. For example, gesture practices offer possibilities (or constraints) for the emergence of local sign languages, and they may also provide a window into changes in cultural practices and cognitive patterns (because of bilingualism, for instance).

In addition to illustrating why we need a subfield of gesture typology, the panel will illustrate why we need it now. Patterns and particulars in gesture have long attracted scholarly interest (Darwin, 1998 [orig. 1872]); however, only in the last decade or two have observations of gesture across cultures begun to accumulate to a point where systematic collation is appropriate. This data accumulation is poised to accelerate in coming years, spurred on by: fresh enthusiasm for documenting linguistic diversity, especially in small-scale indigenous communities; the newfound ease with which video data can be collected, stored, shared, and analyzed; and a growing interest in sign languages and their relation to the gestural practices of surrounding communities. This swell of interest is also marked by an unmistakable urgency: just as human linguistic diversity is vanishing, so, too, is human gestural diversity.

Finally, an important issue taken up in the panel will be research methods—in particular, what steps can be taken to ensure that gestural typology, right from its inception, is an open and cumulative research endeavor.

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A typological sketch of gesture in Yupno (Papua New Guinea)

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The island of New Guinea is widely known as a “hotspot” of cultural and linguistic diversity, with more than a thousand languages (Greenhill, 2015; Palmer, 2017). Yet, to date, gesture in the region has been described only glancingly. Here, we present a sketch of gesture in Yupno, a Papuan language spoken by some 8000 people in the Finisterre Range. Our observations draw on video recordings of informal conversations, structured interviews, and referential communication tasks. Beyond providing a portrait of gesture in a single small Papuan community, we draw attention to phenomena that may be more widely distributed in this under-documented region; and, at the same time, we illustrate how a typological perspective is critical for understanding the sources of gestural diversity.

We focus on three gestural practices in Yupno that are typologically distinctive. The first is the Yupno pointing repertoire. In addition to index-finger and other kinds of manual pointing, the Yupno rely heavily on non-manual pointing, in particular “nose-pointing” (***). Nose-pointing consists of a scrunching facial action, produced along with a marked head movement. In a controlled communication task, we recently found that the Yupno use non-manual pointing numerically more often than manual pointing, in stark contrast to Americans (***). Interestingly, mentions of nose-pointing in nearby communities suggest a wider distribution for the gesture (e.g., in Enga; Kendon, 1980). The second typologically distinctive phenomenon is the use of a conventional facial gesture to express smallness, which patterns with the morphological diminutive in Yupno (***). The presence of this and other facial gestures in Yupno (e.g., eyebrow flashing for affirmation), joined with observations from other communities in the broader region (e.g., Levinson, 2010), raises the intriguing possibility that rich repertoires of conventional facial actions are an areal feature. The third phenomenon of typological interest is the metaphorical conceptualization of time in gesture. The Yupno use uphill-downhill contrasts when gesturing about time, with the past construed as downhill and the future as uphill, regardless of which way the speaker is facing (***). Here, again, there are hints from neighbouring communities that this phenomenon may be more broadly distributed.

A thorny conceptual challenge in the study of gestural diversity is that of explaining phenomena at the right level of generality. All three of the distinctive phenomena considered here can be plausibly linked to particulars of Yupno grammar, communicative ideology, or myth. However, such explanations risk “under-generalization”—that is, explaining a phenomenon in terms of local factors when much more general factors are at play (see Haspelmath, 1997). However, a typological perspective on gesture—which the current panel aims to catalyze—can help researchers avoid the twin perils of “under-generalization” and “over-generalization.”

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Verbo-gestural negation in Savosavo

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This paper addresses the relation of verbal and gestural negation in Savosavo, a Papuan language spoken in the Solomon Islands in the Southwest Pacific (<http://dobes.mpi.nl/projects/savosavo/>). Taking a linguistic perspective on the analysis of multimodal utterances, the following questions will be addressed: Is verbal negation in Savosavo connected with co-speech gestures and if so, how? Can particular verbo-gestural patterns be identified? How do these relate to patterns known from other languages?

In recent years, gesture research has seen a growing interest in the study of recurrent gestures, gestures that show a stable form-meaning relation, are partly conventionalized and culturally shared and often fulfill pragmatic functions. Moreover, particular emphasis has been put on those expressing refusal and negation in languages such as English, French or German (Kendon 2004, Harrison 2009, Calbris 2011, Bresse and Müller 2014). For these gestures, particular verbo-gestural patterns have been identified. Harrison (2009, 2014), for instance, shows that Palm Down gestures correlate with superlatives (e.g., *best*, *most amazing*, *sweetest*) and maximum degree marking adverbs (e.g., *totally*, *absolutely*, *completely*) and, furthermore, reflect the node and scope of verbal negation.

Based on a corpus of 6 hours of video recordings (narratives, procedural texts, interviews) of monologic, dyadic as well as group constellations by altogether 14 male speakers ranging in age from 39 to about 80 collected during the Savosavo Documentation Project (Wegener 2012), the paper presents first results on verbo-gestural negation. Previous findings showed that Savosavo speakers use sweeping away gestures, that is gestures with the palm facing downwards with a horizontal movement, in very similar ways as speakers of Indo-European languages: They enact the completion of a series of events as well as the exclusion or negation of events (Bresse, Stein and Wegener 2015, 2017). As such the findings indicate that the forms and functions of sweeping away gestures might have a wider cross-linguistic and cross-cultural distribution. Taking these results as the stepping stone, the paper particularly concentrates on the gesture's relation with verbal negation. Using 56 instances of sweeping away gestures, the gestures' relation with morphological and syntactic negation will be addressed. Particular emphasis will be put on similarities and differences with verbo-gestural patterns observed for Indo-European languages.

With this focus, the talk contributes to a better understanding of the diversity of verbo-gestural negation in Savosavo. Moreover, it contributes to a possible subfield of “gestural typology” by addressing cross-linguistic or even universal aspects of multimodal negation.

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Spoken and visual negation in two languages of Ecuador

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The method of ‘multimodal typology’ (Floyd and DeVos 2015), which compares ‘composite’ utterances (Enfield 2009) across spoken and/or sign languages as part of a single spectrum of human expression, and similar approaches related to the emerging field of ‘gesture typology’ bring an explicitly cross-cultural and cross-linguistic perspective to studies of visual bodily communication. The extension of methods of grammatical typology to the typology of multimodal expression makes it possible to see both striking similarities in unrelated cultures as well as highly culture-specific types of visual bodily expression. This study directly extends the findings of a particular area of grammatical typology, that of negation (Kahrel and van den Berg 1994; Michael and Granadillo on South American languages in 2014), to multimodal typology. It asks what types of visual bodily expression occur in that linguistic context in two South American indigenous languages spoken in Ecuador: Highland Quichua (Quechuan) and Cha’palaa (Barbacoan). Using two large transcribed video corpora, a data set of examples of gesture and visual expression will be identified during speech representing major grammatical classes identified in negation typology: (1) negation constructions with negative particles like “no/not”, (2) negative verbs like “lack”, and (3) negative pronouns like “none/nobody”. The distinct typological profiles of the two languages structure the types of composite utterances that are possible, for example in the case of Cha’palaa which has no lexical particle “no” at all, but rather a negative suffix requiring a verb. Both languages also show specific cultural conventionalizations such as a Quichua raised and waving open hand gesture to say, “there is no more/nothing/none”. The presentation will review the types of visual expression seen with these types of spoken negation constructions in the two corpora, and make some preliminary observations about trends in composite utterances of negation.

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Corpora, data methods and gestural typology in Syuba

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Syuba (also known as Kagate) is a Tibeto-Burman language of Nepal with approximately 1,500 speakers. This language has been the focus of a language documentation project, which aims to broadly document the features of the language, including gesture (Gawne 2018). This corpus contains 114 video recordings (14.6 hours). Currently over 80 of these recordings have ELAN transcriptions of the spoken content. The corpus is open access and contains traditional narratives, oral histories, explicatory texts, personal narratives, earthquake narratives, conversation, and songs. Although documentation corpora of this kind are not specifically designed for gesture research, well-shot video data can increase the diversity of languages that inform the growing typological understanding of gesture.

In this presentation, I give a brief example of the kinds of typologically-driven questions about gesture that can be investigated with this corpus. I focus specifically on three topics that span the typological discussion of gesture. The first two case-studies are both examples of ‘pragmatic’ (Kendon 2004) gestures. The first is a particular gesture with ‘away’ movement that is used with discussions of ‘nothing’ in Syuba narratives. This gesture fits within a broader typological discussion of ‘away’ gesture types (Bressem & Müller 2014), but requires a reconsideration of the currently proposed motivation for these gestures. This is an example of how analysis in a broader range of languages can enrich existing discussions of known gesture types. The second is a ‘rotated-palms’ gesture that is used to indicate interrogativity. This feature is also seen in cross-linguistically in Warlpiri (Kendon 1988: 146) and Indo-Pakistani Sign Language (Zeshan 2000: 39), but has not until now been considered a topic of typological exploration. This example demonstrates that there are features that have been described across languages that may be included in a developing gesture typology. The third case-study focuses on deictic gestures. Syuba supports the existing literature with regards to frequently observed handshapes (Wilkins 2003), but enriches the typology through a need to understand the importance of altitude in deictic reference, with narratives embedded in the landscape of the Himalayas.

In discussing these particular examples, I raise questions about what kind of evidence base will be required for a field of gestural typology, and how this may compare to the current work in grammatical typology (*cf.* the journal *Linguistic Typology*). In particular, I discuss the challenges in developing suitable size corpora, and annotating gestural data. I also discuss the need for research to be built on transparent methods, and data management that allows the reader to access the data on which the claims are made (*cf.* Berez-Kroeker *et al.*).

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There's a fine line between gesture and sign: Exploring the semiotic diversity and distribution of an action for GO in Central Australia

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In semiotically rich language ecologies where sign, speech, gesture and even forms of graphic representation can combine in multimodal utterances the question of what constitutes sign and what gesture is not a trivial one. A parallel issue arises in determining the difference between the spontaneous and the quotable in communities where extended repertoires of 'quotable gestures' or 'emblems' are found (Brookes, 2004; Kendon, 1992). In Central Australia, where Indigenous alternate sign languages are highly developed (Kendon, 1988), sign use is optional and culturally driven, and in everyday interactions pointing and non-conventionalized gestures are also found. Another complicating factor in the Australian context is that extensive knowledge of alternate sign is endangered and there is variation in the use of sign, ranging from the reliance on sign-only in circumstances when speech is proscribed, to everyday casual and pragmatic use of co-speech sign where a smaller sign repertoire is drawn upon.

In this paper, I argue that such semiotic versatility poses important challenges for the study of both gesture and sign in Indigenous Australia as well as for the emerging field of gesture typology in general. To do so I look in detail at one particular 'action' found amongst Arandic and Warlpiri speaking language groups from Central Australia, drawing on an extensive filmed corpus of multimodal narratives and of sign languages. Wilkins (2003) was at first tempted to analyse this horn handshape action as a deictic gesture, but later concluded that it is more appropriately regarded as a sign meaning GO. This underscores the importance of paying attention to meta-theories of communicative actions, but also shows that the role that convention plays in sign, gesture and pointing is not always clear-cut. Whether or not this particular action is analysed as a sign or a gesture, its use is ubiquitous. It occurs frequently in sand stories (Wilkins 1997; Green 2017). Figure 1 illustrates the way the GO action may be combined with a 'U' shaped line drawn on the ground, representing 'person', to achieve the meaning 'a person gets up and goes'. Although in citation form the action is clearly articulated, in multi-utterance sequences the articulation may become so relaxed as to render it almost indistinguishable in form from other actions that have been described as pointing. Like pointing gestures, the GO action is deployed in a geo-centred absolute frame of reference (Wilkins, 1997) and elevation of the action may be used as a strategy to indicate distance (Figure 2).

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Exploring the multilingual mind in speech and gesture: A focus on West Africa

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Linguistics and Gesture Studies have predominantly focused on monolingual speakers in western societies (Henrich *et al.* 2010; Bohnemeyer & Levinson 2011). This preference limits our understanding of these fields, especially regarding gesture typologies and cognitive diversity. By drawing on data collected from multilinguals in Senegal, I present two sets of findings. The first set briefly explores deictic gestures in the region, namely a “snap-and-point” gesture that uses both audible and visual cues. The second set of findings focuses on the cognitive diversity of multilingual speakers by studying speakers’ descriptions of placement events across modalities. The latter findings are discussed in more depth in this talk.

Bilinguals are not two monolinguals in one: bilinguals exhibit evidence of a merged system due to influences from other languages, rather than having separate, discrete linguistic systems (Grosjean 1989). The nature of this merged system has been shown to converge to a more general system among bilinguals in European contexts: these speakers drop fine-grained information about placement when compared to their monolingual counterparts (Alferink & Gullberg 2014; Berthele 2012). Speakers of the Casamance region in Senegal, however, use an average of 6 languages daily and are multilingual. Furthermore, the majority of these speakers’ languages encode fine-grained semantic distinctions and only two are understood to encode path-only information. The question arises whether the nature of the linguistic system is still one of generality for these multilingual speakers considering that their linguistic repertoires show a higher proportion of languages that make fine-grained semantic distinctions.

There were 18 multilingual participants, aged 18-32, who reside in the Casamance. The majority of languages in these speakers’ repertoires make semantically fine-grained distinctions in the domain of placement events (i.e., using postural verbs such as ‘sit’, ‘stand’, and ‘lay’). The study targeted French and Joola Kujireray, the former encoding broad-grained information (‘put’), and the latter using both broad- and fine-grained information (‘sit’, ‘stand’, ‘lay’, and ‘put’). All participants reported speaking these languages, among others. Two director-matcher tasks were created to elicit descriptions of placement events. The data were analysed for whether fine-grained or broad-grained information about placement events is expressed across modalities.

The speech analysis showed a mixture of both broad- and fine-grained semantic information in verb roots in both languages. The data revealed that the French is strongly influenced by the more fine-grained languages. The gesture analysis revealed that speakers expressed fine-grained information in co-occurring gesture regardless of the language spoken. These results indicate that the semantic distinctions encoded in the languages of speakers’ repertoires influence whether a speaker’s cognitive system can be described as general or specific. I conclude that Linguistics and Gesture Studies must include speakers of non-Westernised regions to deepen our understanding of gestural typologies and cognitive diversity.

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A typological sketch of gesture in Yucatec Maya (Mexico)

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The aim of this talk, is to propose a typological sketch of gestural practices among the Yucatec Mayas of Mexico. For this, I will consider several gestural practices among the Yucatec Mayas, taking into account how they related with each other (e.g. how semantics domains can constrain each other) but also what is specific (but maybe not exclusive) to this speech community. My data comes from long term ethnography conducted in the native language, video recorded data of natural interactions narratives and elicitations.

First, I will be looking at body placement during interactions as well as the frequency of gesture production, taking into account speech genres.

One main area of interest of gesture studies and a domain that constrains many others is space. I have considered how the use of a geocentric frame of reference imposes certain restrictions on pointing for places and person reference (Le Guen 2011a, 2011b) but also how time conceptualization and time reference (Le Guen & Pool Balam 2012).

Multimodal communication is crucial in Yucatec Maya and speakers rely on different dimensions of gestures to produce their communicative message as “composite utterances” (Kendon 2004). I argue that this is mainly due to the fact that disembodied forms of communication (writing, telephone, etc.) and literacy never have had a strong impact on communication, along with the absence of a negative ideology regarding the use of gesture. Hence, Yucatec Mayas tend to use maximally all channels of communication and we note many forms of visual complementation to speech (Le Guen, in press). I will illustrate this point with examples of use of size and shape specifiers, iconic and quotable gesture, use of character perspective including statistical analysis. I will also show how gesture can be a direct complement to expressive morphology, and how it helps for elicitation of the meaning of ideophones (Le Guen 2012).

I will also rapidly consider pragmatics gestures, looking at epistemic gestures and the use metaphorical pointing for opposition.

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Panel: Multimodality in the verbal arts

Panel chair: Jennifer Green¹

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This panel will showcase work by scholars who are critically engaged with looking at visible and embodied aspects of narrative practices and verbal arts in a range of cultural and ecological circumstances. The focus will be on examples drawn from the global south, including papers from South America, Australia, and Vanuatu. There is immense variation in the ways that verbal art forms fit within the broad spectrum of oral and poetic traditions (Bauman, 1986; Rumsey & Niles, 2011). Diversity is also evident in the range of semiotic resources employed. As well as speaking or singing, people may create diagrams and other graphic traces for narrative purposes. Body decorations, dance and other embodied actions are also part of the picture and a crucial component of the verbal arts in many societies.

Understanding why particular verbal art forms emerge, and modelling exactly how this complexity is orchestrated, remains one of the challenges for understanding human language in the myriad contexts of its social uses. In addition, verbal art forms are often viewed as the pinnacle of a culture's linguistic and musical achievements (Evans, 2009). They are also seen as an important component of language documentation (Jakobson, 1960 [1971]; Barwick, 2012; Seyfeddinipur, 2012; Epps, Webster, & Woodbury, 2017). As well as their performative and cultural significance, verbal arts may shed light on other aspects of language, revealing links between natural, social, and metaphysical worlds. As Bauman (2004) suggests, verbal arts are anchored in the social and cultural worlds of their users. This panel will bring linguistic and anthropological insights together, break new ground in the emerging field of cross-modal and multimodal typology, and engage with topics including:

- Ecological factors underpinning verbal arts (for example in some regions of the world the availability of inscribable ground affords narrative practices that include drawing, as found in the sand stories of Central Australia and Vanuatu)
- Multimodality in narrative practices and the verbal arts
- Intergenerational transmission of verbal arts and narrative practices in the context of rapid cultural and technological change
- Non-linguistic aspects of verbal arts – special song languages, sound symbolism, visual design, and other performative actions

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Action matters: Visible representations of kinship in Central and Northern Australia

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Many of us now take it for granted that human interaction is essentially multimodal. As well as speaking or using a sign language, people point, manipulate objects with their hands, and create maps, diagrams and other graphic traces on a range of surfaces. But answers to questions of how cross-modal and ‘polysemiotic’ integration is achieved, when it is preferred, and what communicative ‘systems’ can go together remain more elusive. In this presentation, I explore these questions by focusing on kinship, a key domain long investigated by anthropologists and linguists alike. The examples are drawn from the rich and complex communicative environment of Central and Northern Australia where Indigenous peoples employ various forms of what is locally termed ‘action’ (sign and gesture) alongside speech and drawing practices. I argue that considering these actions, that either accompany speech or replace it, enhances understandings of the terminologies and conceptual structures of kinship and provides an opportunity to move beyond “the anthropology of words” (MacDougall, 1997).

I foreground this discussion by giving a brief overview of these Australian kinship systems. I then discuss three main modes of representation. The conventionalised lexicon of ‘alternate’ sign languages throws light on the underlying features of kinship, as well as providing visible instantiations of embodied forms of social interaction (Kendon, 1988; Green, Bauer, Gaby & Ellis, in press). Co-speech gestures that accompany spoken kin terms illuminate aspects of their meanings that are not apparent if we consider speech alone (Enfield, 2005, 2009). Finally, yet another perspective is provided by semi-permanent and ephemeral graphic representations of kinship found in dynamic narrative practices such as sand drawing (Green, 2014), children’s games about kin (Ellis, Green & Kral, 2017), and in the repertoires of desert artists. A comparison of these modes of representation, and the ways they work together, provides an opportunity to examine cross-modal interaction and diversity in a domain of core cultural salience.



From sand to screen: Embodied actions in multiple media from the Western Desert

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The art of storytelling plays an important role in the cultural life of the Ngaanyatjarra people of the Western Desert of Australia, as does the performance of *turlku* (songs and dances) of the *tjukurrpa* (the Dreaming). *Tjukurrpa*-related music and storytelling remains key to contemporary cultural identity and wellbeing. “We remember it all, in our minds, our bodies and feet and as we dance the stories we continually recreate the *tjukurrpa*”, states an elder. The Western Desert storytelling tradition employs certain embodied devices to sustain audience attention including gesture, sign and gaze as well as somatic aspects derived from *turlku*—the tapping of sticks by men, and the rhythmic sounds made by women who cup their hands and beat them on their laps like a drum. In this presentation, we look at two examples of the contemporary narrative tradition—*mirlpa* or sand storytelling, and the process of making digital song recordings. We take an anthropological approach to explore the interrelationship between context, social practice and bodily action in interaction (Streeck 2009). As Bauman (2004: 32) states, any analysis of “oral performance in context” also directs attention “to the anchoring of verbal art in the social and cultural worlds of its users”.

The common practice, particularly among old and young women, of narrating stories in the sand integrates visual representations and iconography with other visual, kinesic and haptic modalities including gesture, gaze and sound. *Mirlpa* stories are recounted not just through the spoken word, but as a dynamic interplay between embodied action and visual enactment across multiple surfaces (Green 2014). As well as being a fundamental organising principle of music and song, tapping a beat or rhythm in the sand with the hands or with a ‘story wire’ commonly accompanies the stories. Such rhythmic tapping engages interlocutors and draws attention to highpoints in the narrative.

Despite new dispositions, Ngaanyatjarra youth remain deeply rooted in the enduring relationship between place, identity and the *tjukurrpa* (Brooks 2011; Kral 2012). This is displayed in the ways that young male musicians are using digital technologies to lay down new narrative forms, drawing thematic inspiration from ‘travelling narratives’ from the *tjukurrpa* canon. Multimodality in this case incorporates the symbols found in the software, as well as gesture, sign, gaze and eye contact, and other kinesic signals (Kral and Heath 2013). In the process of song composition and recording young musicians “raise the rhythm”, raising the song from the body through a form of embodied tapping-out where the rhythm or the beat acts as a mnemonic for the song.

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Sand drawings: Field notes on a Melanesian way to memory

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The Bislama term *sandroing* (En: ‘sand drawing’; Fr: ‘dessin sur sable’) refers to a practice now quite disused, but once spread in most of the northern and central islands of the Republic of Vanuatu, a Melanesian archipelago located in the South-Eastern part of the Pacific Ocean. Sand drawing consists in tracing on the soil, with the index finger of the right hand, an ephemeral, usually complex, geometrical image (*cf.* Huffman in Bonnemaïson *et al.* 1996; Zagala 2004). This may represent an object, a living being, a story or a spiritual entity and its achievement is complemented or followed by a more or less detailed oral commentary. In contrast to Indigenous sand stories from Central Australia that are primarily performed by women (Munn 1973; Green 2014) the performers are usually men, but the activity is not secret since women and children may freely watch them at work. Ni-Vanuatu sand drawing was declared a masterpiece of the oral and intangible heritage of humanity by UNESCO in 2003 (UNESCO 2004), but despite such a recognition – and the fact of having been mentioned in academic works since the 1930s (Firth 1930; Deacon, Wedgwood 1934; Layard 1936; Rowe 1936) – this ephemeral art form has never undergone in-depth, ethnographic or multimodal analysis. In the last three years, I devoted myself to the study of this practice, and in this intervention I will present the results of ongoing research that I am conducting, in collaboration with the Vanuatu Cultural Centre, on the island of Ambrym. Based on data collected in the field, on theories developed in the domain of the anthropology of memory (Severi 2004) and on recent reflections over translation forms (Hanks, Severi 2015), I will describe local sand drawing practice, with the aim of providing a tool to better understand this device, reconsider its general function and evaluate its evolution in time.

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Celestial pointing for time reference in Nheengatú narrative (and beyond)

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This study builds on the findings about the indigenous Amazonian language Nheengatú's system for temporal reference, a visual resource which complements a grammar without higher numerals or tense by providing detailed temporal information by pointing at positions along the sun's path in the sky (Floyd 2016). That work was able to put these visual practices in the context of grammatical, linguistic expression; this study follows up by putting this practice in some cross-linguistic and discourse-pragmatic contexts. It will begin by first reviewing the multimodal typology of celestial pointing, reporting on ongoing comparative work in collaboration with Connie De Vos (Floyd & De Vos 2015) which compares similar practices across both spoken and signed languages, such as the Kata Kolok language of Bali (see De Vos 2015). Then it will take a closer look at how Nheengatú celestial pointing operates in narrative discourse in relation to the temporal progression of events in a selection of narratives from a video corpus. After this detailed look at narrative in one language, some general points will be made about how celestial pointing for time reference could play a role in narrative discourse in different languages with similar visual systems for time reference.

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Panel:

The diversity of recurrency: Recurrent gestures cross-linguistically

Panel chair: Simon Harrison¹

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One aspect of Gesture and Diversity (the theme of ISGS 8) is the widespread distribution of partly conventionalized gestures, often called recurrent gestures. Though recurrent in form and function (Ladewig 2014a), these gestures exhibit great diversity in how, when, and why they are used. This diversity is manifest at the level of individual gestures in terms of kinesic variants and contexts-of-use, as demonstrated for example by the ‘palm up open hand’ (Kendon 2004; Müller 2004) and the ‘cyclic’ gesture (Ladewig 2014b). It may also be manifest at the level of grammatical structure and meaning construal in a particular language. Families of recurrent gestures have been identified that bind with the grammatical realisation of a particular concept, such as negation (Calbris 2011; Bressemer and Müller 2014, 2017; Harrison 2014, in press; Kendon 2004). Beyond kinesic, cognitive, and linguistic variation, the diversity of recurrent gestures is observed at the level of the individual speaker, regarding his or her communicative aims in a particular discourse community (Lempert 2011, 2018; Harrison in press). Diversity is also observed both when we identify how a given linguistic community may use a particular recurrent gesture (e.g. Bressemer, Stein and Wegener 2017) and when we establish the repertoire of recurrent gestures in circulation among such a linguistic community (e.g. Calbris 1990; Bressemer and Müller, 2014).

This panel proposes to address the diversity of recurrent gestures from a cross-linguistic perspective. The four papers will each be examining recurrent gestures with the goal of gaining better understanding of the nature of gestural recurrency as a widespread characteristic of gestures, as used within different linguistic communities. The papers will be designed to facilitate discussion of the following questions:

- Within a particular community, can we identify which features of recurrent gestures are subject to variation or stabilization?
- What factors may determine the diversity of recurrency across and within different linguistic communities that use a particular recurrent gestural form?
- How are recurrent gestures acquired in the development of multimodal language?
- Why do certain discourse contexts or communicative functions lead to recurrent gestures? What forces—evolutionary, physiological, cognitive, social and cultural—drive gestural recurrency?

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The embodied nature of aspect – a cross-linguistic comparison of the cyclic gesture in English, Farsi, and German

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Cyclic gestures are a recurrent type of manual gesture formally characterized by a continuous circular movement of the hand. While speakers across languages use cyclic form gestures when they talk, only one published research study to date, specifically looking at German, has examined the relationship this particular type of gesture has to language. Ladewig (2011, 2014) found that cyclic gestures used in German are associated with both the literal and metaphorical expression of ongoing actions expressed in speech. The basic form and the semantic core (i.e., cyclic continuity) of the cyclic gesture, Ladewig argues, are motivated by the image schema CYCLE, which has emerged from experiences with cyclic motions and the recurrence and repetition of events through time. As the form of the cyclic gesture is itself a continuous or repeated action, this gesture type offers a fruitful avenue of departure for cross-linguistically exploring patterns associated with the multimodal expression of lexical and grammatical aspect.

In this study, we examine associations between cyclic gesture use and aspect in three languages: English, German, and Persian (Farsi). The aims of this study are (1) to describe what types of aspectual construals are recurrently used with cyclic gestures in each language, (2) to explore whether different formal variants of cyclic gestures in each language are associated with different aspectual construals, and (3) to identify cross-linguistic similarities and language-specific patterns to the use of cyclic gestures with regard to the expression of aspect. Data come from video recordings of everyday conversations and interactions in German and from television talk show programs in German, American English, and Farsi.

Our study finds that, across the three languages, cyclic gestures are used recurrently with spoken language constructions that include continuous, habitual, and iterative aspectual construals. So far, we have not found evidence for stability of form for cyclic gestures associated with lexically expressed aspectual meanings. Yet, language-specific properties appear to interact with the stability of formal variants of cyclic gestures co-occurring with progressive constructions in English (associated with bimanual, asynchronous, large circles). These instances suggest a stabilization of form and meaning on the level of “multimodal constructions” (Hirrel in prep, Zima 2014, 2017). While cyclic gestures do occur with progressive constructions in Persian, there is a low degree of formal stability (German has no progressive). Crosslinguistic similarities in the use of cyclic gestures for the expression of particular aspectual meanings support Ladewig’s analysis of an experiential basis for cyclic gestures. Our findings also suggest an interaction of language and gesture on the level of grammar, which can lead to the formation of language-specific multimodal constructions.



Handling talk in German and Savosavo: A cross-linguistic perspective on discursive functions of gestures

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This paper discusses how a particular type of recurrent gesture, the *holding away* gesture, may highlight and structure spoken utterances in German and Savosavo, a Papuan language spoken in Solomon Islands in the Southwest Pacific (<http://dobes.mpi.nl/projects/savosavo/>). In particular, the paper poses the following questions: What kinds of discursive functions are observable in both speech communities? How do these map onto the different speech communities? Are there cross-linguistic similarities and differences detectable? What drives possible commonalities and variances across speech-communities?

Recurrent gestures, such as the *holding away* gesture, have become a major focus in the field of gestures studies, due to their particular semiotic nature (stable form-meaning relation, partial conventionalization, cultural specificity, pragmatic functions) (see Ladewig 2014). Among other findings, research has shown that they “relate to features of an utterance’s meaning that are not a part of its referential meaning or propositional content” (Kendon 2004: 158). As such, they may assume performative function, mark the illocutionary force of an utterance and highlight properties of discourse (e.g., Kendon 2004, Müller 1998, Steeck 2009). Along with other gestures expressing refusal and negation, a range of pragmatic functions of the *holding away* gesture have been discussed in different languages such as English, French or German (Kendon 2004, Harrison 2009, Calbris 2011, Bresse^m and Müller 2014). Yet, their particular discursive relevance has not been addressed in utmost detail.

Picking up Fraser’s pragmatic classification of discourse markers (1999), previous findings showed that the *holding away* gesture has the potential of fulfilling three functions in Savosavo (Bresse^m, Stein, Wegener 2015, 2017). Based on a corpus of 6 hours of video recordings by altogether 14 male speakers ranging in age from 39 to about 80 collected during the Savosavo Documentation Project (<http://dobes.mpi.nl/projects/savosavo/>), it was shown that the gesture may signal the speaker’s focus on a *conclusion and change* of topic. It highlights the *contrast* between two propositions or signals that the speaker is *inserting* additional information. Taking these results as the stepping stone, the paper addresses the gestures’ discursive relevance for spoken discourse in German. Based on 34 hours of video material and gestures of 37 speakers, it will be discussed whether and what kinds of functions the gesture fulfills in German discourse. Particular emphasis will be put on possible similarities and differences with the patterns observed for Savosavo discourse and the influence of genre and discourse type on variants and functions of the *holding away* gesture.

By pursuing a cross-linguistic and cross-cultural perspective, the talk adds a further puzzle piece for language specific or possible universal functions of pragmatic gestures. In particular, it contributes to a better understanding of the diverse functions of recurrent gestures for structuring and highlighting discourse.



A cross-linguistic developmental comparison of a recurrent gesture: How German, French and British children learn to shrug

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Over the past years quite a few studies have addressed children's verbo-gestural utterances, but only very few have considered co-speech functions of recurrent gestures (Andr n 2010, 2014; Graziano 2014; Beaupoil-Hourdel & Debras 2017). However, as correlations between the semantic-pragmatic role of recurrent gestures and their formational core is common, it is valuable to study their role developmentally. Recurrent gestures are conventionalized to a certain degree and culturally shared (Bressemer & M ller 2014; Ladewig 2011, 2014; M ller, Bressemer & Ladewig 2013). Their form-meaning relation remains stable across contexts and speakers. How children learn to use these specific co-verbal gestures in interaction across languages and cultures is a fundamental issue to understand their significance.

We focus on the development of a composite communicative gesture, the shrug, in three longitudinal follow-ups in three different languages and cultures: German, French and British English. The shrug in its full-fledge form can combine palm-up flips, lifted shoulders and a head tilt (Kendon 2004; Streeck 2009). A number of recent studies have shown that shrugs are commonly produced by children using different languages (Beaupoil-Hourdel & Debras 2017; Blondel *et al.* 2017). We will compare three datasets with an approach in which we integrate form-based and function-based analyses.

Three children were filmed at regular intervals from age 1 to 6 during different situations. All occurrences of children's shrugs were coded in the three datasets indicating their function in the multimodal ongoing discourse and their formal components. Our preliminary results indicate interesting differences in the three little girls' pathways as well as common features. Those case studies do not allow us to draw conclusions as to cross-cultural variations in the use of shrugs across languages, as they could be attributed to individual differences. However, despite the differences in frequency, form and functions in the three children, there are interesting *similarities*:

- First phase: Children use the composite gesture early, they start by expressing absence with the palm up open hand or with the shoulder lift.
- Second phase: Shoulder lifts are used, mostly to express epistemic functions (I don't know).
- Third phase: Shoulder lifts will be used for affective stance and head tilts will be used in isolation or added to the other components. The three children's repertoire of forms and functions is enlarged. Head tilts are used for personal stance when the children are cognitively and linguistically able to express interpersonal positioning.

This preliminary trend could be analyzed deeper and needs confirmation with a larger number of children. It would be interesting to compare it to adult's cross-linguistic uses of the shrug. However, our case studies already indicate the importance of coding multimodal expressions for form and function in developmental data.



***Wiping Away* in situated activity: Instrumental action as source for cross-linguistic similarity in form and function of a recurrent gesture**

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Several recurrent gestures have been named after instrumental actions, such as ‘holding away’, ‘brushing aside’, and ‘precision grip’. The logic behind this nomenclature stems from analyses of the form and function of such gestures observed in natural spoken discourse (Kendon 2004; Streeck 2009; Teßendorf 2014; Bressem, Stein & Wegener 2017). Central to the theory of recurrent gestures has therefore been the claim that “[g]estures often constitute re-enactments of basic mundane actions, grounding the gestures’ communicative actions in real world actions” (Bressem, Ladewig and Müller 2013: 1106; Ladewig 2014). McNeill (2016), however, rejects this re-enactment claim in favour of a clear theoretical separation between ‘action-actions’ and ‘gesture-actions’. Conversely, other researchers may view the claim as already separating instrumental action from gesture *too far*, given that instrumental actions may also be made explicitly communicative and exhibit representational complexity (Andr n 2014; cf. Cadoz 1994; LeBaron & Streeck 2000). The current paper contributes to this debate by starting not with a recurrent gesture but with an instrumental action. The definition of ‘wipe away’ is to “remove (dirt or moisture) from something by wiping” (Oxford Dictionary of English). The relevance of this particular action here is its proposed basis for a number of recurrent gestures associated with the expression of negation (Kendon 2004; Calbris 2011; Harrison in press).

To analyse the re-enactment claim cross-linguistically, interactive sequences that involve people wiping things away have been collected from diverse linguistic settings for comparison. In the first setting, a lifeguard on a beach in France explains to his colleagues how to find south without a compass. As part of his instruction, he repeatedly draws then wipes away diagrams in the sand immediately in front of where he is seated. In the second setting, a new home owner in China inspects the workmanship of her designer tiles and notices a problem. The alcohol spirits that the builders used to clean the tiles have left several white patches, which she now begins to wipe away.

After an introduction, my presentation will walk the audience through multimodal, sequential analyses of these two interactive sequences. By attending to interactive phenomena including eye-gaze (Stivers & Rossano 2010), embodied participation frameworks and environmentally-coupled gestures (Goodwin 2007), I will argue that actions, gesture, and language coalesce in situated activity in ways that support the re-enactment theory of recurrent gestures. Specifically, I will show how wiping away may acquire communicative properties through embodied interaction and mutual elaboration (Hutchins & Nomura 2011). Wiping away may also connect to and indeed blend with gestures associated with negation that continue to occur with the ongoing speech. Analysing this continuity, instrumental action will be discussed as one potential source for cross-linguistic similarity in the form and function of recurrent gestures.



Panel: Gesture and habit across communities of practice

Panel chair: Kuan Hwa¹

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How exactly do humans learn in bodily ways? And, how do such learning practices vary across cultural contexts? This panel investigates the role that gesture and body movement play in learning processes and conceptual development across the diverse disciplines of body conscious design, the somatic arts, education, anthropology, and philosophy. This panel borrows the idea of “community of practice” from Jean Lave and Etienne Wenger’s (1991) description of a shared culture of learning. In their purview, culture is not national in character, but rather sociologically or anthropologically specific, and varies on the basis of a common activity. This panel begins with the premise that gesture is one constitutive commonality across diverse communities of practice, and through multiple disciplinary approaches to gesture we can more deeply understand the identities and complexities of communities of practice, and their attendant formations.

The papers in this panel use interdisciplinary approaches in both the social sciences and humanities as a response to this divide, as a double-approach to the collaborative question of gesture. Papers are motivated by inquiry into the role of human gesture and body movement within the context of neurodiversity, creativity, and intercorporeality. Situated within recent debates in embodied cognition and theories of interactivity, three empirical studies and one theoretical essay examine intercorporeal gesture within contexts of physical and cognitive learning across diverse communities of practice.

The first paper provides an argument for neurodiversity in reconceptualizing autism as a different form of being, not a deficit. Autistic repetitive gestures, which have traditionally been viewed as communicative, automatic, and perseverative, have been reframed by autistic semiosis as an expression of focused engagement, and intrinsically motivating. Her paper affirms autistic semiosis through an illustration of intercorporeality in autistic repetition. The paper’s analysis of a free-style drum session with 6 autistic adults unveils that variation and improvisation can transpire incrementally after baseline cycles of the same rhythmic patterns are first established. The players’ sensual and rhythmic attunement to one another allows them to modulate, vary and transform their own motor patterns while still belonging to the same rhythmic collective. The author parallels similarities between autistic repetitive gestures and jazz improvisation and argues that experiencing repetition/variation is valuable to both neurodiverse and neurotypical individuals, as a corporeal, and intercorporeal experience.

The second talk fuses anthropological and philosophical approaches in order to examine gesture as a crucial element in collective learning across diverse somatic practices that are locally and culturally specific. The authors argue that collective learning processes are to be understood within an enactive approach: As specific gestures can be acquired and trained, intercorporeality can be trained and refined as well. Their findings are supported by 12 months of ethnographic and autoethnographic fieldwork that investigated the role of gesture in social formations among adult practitioners of contemporary dance in Vienna, Austria, and Feldenkrais Method in Berkeley, California, USA. Somatic practitioners and dancers are a specifically apt research population for gesture studies because they consciously reflect on how they use their bodies and actively train their bodyminds, thus regularly and systematically



rehabituating their somatic gestures. As a comparative empirical study, this essay contributes to the recent discourse on intercorporeality in the study of gesture (Merleau-Ponty 1945, Tanaka 2015, Meyer, Streeck and Jordan 2017) from the field of somatic practices.



Attunement in bodily rhythm: intercorporeality in autistic repetition

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Embodied repetition occurs in every human experience—after all, the body has a corporeal capacity to sense rhythm through its physiology, allowing for sensations to organize one’s subjective experiences of the external world (Edensor, 2010). Sensing and making sense of the world thus become mediated by rhythm, circulating in and out of the body intercorporeally (Duffy *et al.*, 2011). Through an empirical study on autistic bodily repetition, this paper hopes to contribute to recent discourse on intercorporeality in the study of gesture (Meyer, Streeck and Jordan 2017).

Bodily repetition (stimming) has garnered a highly-contested discussion in autism, where on one hand it holds a mainstream interpretation as non-communicative, automatic, and perseverative, and on the other, it is reframed by the neurodiversity movement as an intrinsically motivating sensory expression of focused engagement (Nolan & McBride, 2015). Significant effort of neurodiversity activists and scholars has been devoted to affirming autistic semiosis as an embodied mode of perceiving, experiencing and relating to the world, which opens possible dimensions to autistic repetition as communicative, pleasurable, or even socially valuable (Bakan, 2014). This paper analyzes a free-style drum session involving 6 autistic adults as a context for examining intercorporeality in autistic repetition. Although drumming may be a sanctioned socio-cultural practice and stimming is not treated as such, the paper argues for a common sensory-motor underpinning to both activities. The data were transcribed and analyzed according to the conventions of conversation analysis (Atkinson & Heritage, 1984), and rhythms were transcribed according to music score conventions.

The analysis unveils that variation and improvisation can transpire incrementally after baseline cycles of the same rhythmic patterns are first established. Whenever a new drummer entered the interactional dynamics of the drumming circle, new patterns of repetitiveness emerged as the boundaries of variation were constantly negotiated. Furthermore, behavior that would have been clinically characterized as autistic repetitive behaviors also emerged in reaction to changes in the drumming patterns. Sensual and rhythmic attunement to one another allowed the players to modulate, vary and transform their own motor patterns while still belonging to the same rhythmic collective.

These patterns of repetition and variation are analogous to that of jazz improvisation, which depends fundamentally on repetition, routines, rituals, and practiced activity, from which spontaneous achievement can occur within the constraints of the possible (Alperson, 2010). Repetition in jazz improvisation resolves towards the ‘automatization’ of expertise and mastery of knowledge, which then allows for departures from repetition in the form of variation, creativity, and innovation, through an interactive, intercorporeal enactment. The parallel between autistic and non-autistic repetitiveness demonstrates that perhaps both are not so different, and that such repetition is valuable to both neurodiverse and neurotypical individuals, as a corporeal, and intercorporeal experience.



Enacting intercorporeality in somatic practice: Two empirical studies

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Based on ethnographic and auto-ethnographic fieldwork from 2016-2017 with adult contemporary dancers in Vienna and Feldenkrais practitioners in Berkeley, this paper proposes an empirical contribution to the recent discourse on intercorporeality in gesture studies (Merleau-Ponty 1964, Tanaka 2015, Meyer *et al.* 2017). Contemporary dance and Feldenkrais operate predominantly outside of language, that is, their measures are not taken from the discursive or linguistic realm (Melrose 2009). In order to conceptualize dance and Feldenkrais on their own terms, we offer a notion of gesture that is intercorporeal rather than intersubjective, sensible rather than strictly semiotic (Noland 2009, Flusser 2014, Langer 1956). This notion is developed from our observations in the dance studio and the Feldenkrais session.

Somatic practitioners and dancers are an apt research population for gesture studies because they actively train their bodyminds and consciously reflect on this process. In this sense, they rehabilitate their gestures regularly and systematically. We argue that the movement-oriented pedagogy of contemporary dance and Feldenkrais allows for a specific inculcation and entrainment of gesture. As practitioners train movements, they enact a specific organization within and in-between one another. We call this dynamic organization an intercorporeal structure. What is commonly perceived as individual participants training together can in fact be understood as such an intercorporeal structure. That is, every individual bodymind contains and extends into this intercorporeal field. We argue that this intercorporeal structure is enacted through concrete somatic gestures.

Dance and Feldenkrais bring about somatic gestures and intercorporeal structures that are unique to each somatic discipline. Yet, we have observed that contemporary dance and Feldenkrais share similarities across their socio-cultural backgrounds, too. In both practices, gesture neither serves as auxiliary communication in a preformed language system, nor as a symbol for an underlying meaning given through language. To be bodily in dance and Feldenkrais is a moment of setting time to consciously attend to one's habitual body toward refining body techniques for self-awareness and sociality. If gestures in dance and Feldenkrais are conceived as movement set apart from instrumental ends in daily life, one function of these gestures is that they actively produce particular ways of being intercorporeally. While phenomenology maintains that all animate life consists of movement (Sheets-Johnstone 2011), somatic practices specifically make human movement the primary technique of being together with and through others. As specific gestures can be acquired and trained, intercorporeality can be trained and adapted as well. From this view, the bodyminds of the practitioners emerge as capable of transformation, enabled by and enmeshed within dynamic intercorporeal structures, rather than as skin-bound body propers (Farquhar/Lock 2007). Consequently, we propose an expansion of gesture studies to include an enactive and adaptive notion of intercorporeality that is sensitive to cultural difference.

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Panel: Rethinking the role of gesture in signed language discourse

Panel chair: Terry Janzen¹

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The relationship between gesture and signed language has been debated ever since signed languages began to be recognized as full-fledged languages on par with their spoken counterparts. In the 1970s and 1980s when early work was being done in linguistics on the grammatical structure of signed languages, researchers frequently argued that signed languages were not simply gestural systems, but were organized around the same rules and principles that linguistic theories at the time proposed for spoken language structure (e.g., Fischer 1975). Many of these discussions centred around iconic features of gestural material and how young L1 learners of signed languages did not seem to pay attention to iconicity (Klima and Bellugi 1979) or that iconic features of signs diminished over time in favour of arbitrariness in signs (Frishberg 1975).

Janzen (2017) outlines two ways that gesture has remained critical in how we understand signed languages to be and to have evolved, and in both cases, gesture is thought to give way to the linguistic nature of these languages. First, Armstrong and Wilcox (2007) propose that the origins of human language altogether are gestural, thus suggesting that links between gesture and signed languages have been present since the beginning of language emergence. Second, in studies of signed language grammaticalization, a number of researchers have posited that rather than older lexical words being the sources of grammatical units, in signed languages there are many cases where gestures are the roots of grammatical morphemes (Janzen 1998, 1999; Shaffer 2000, 2004; Wilcox and Wilcox 1995) such that some routes to grammaticalized items bypass a lexical stage altogether (Janzen 1999; Wilcox 2007). In each case, however, these researchers propose that gestures diminish over time while lexical and grammatical (i.e., linguistic) material emerges.

But Janzen (2017) goes on to suggest that despite these more traditional ways of understanding links between gesture and language, gestures are still very much present in modern signed language discourse. His focus is on American Sign Language (ASL), and he puts forward the notion, based on (Enfield 2009, 2013), that composite utterances abound in signed languages just as they do in spoken languages. That is, the meaning of an utterance can only be fully understood when speech, or signing, takes place along with gestural components. In other words, gesture is alive and well in signed language utterances today.

In this theme panel, four researchers come together to build on the notion that gestures must be considered in signed language discourse if we are to fully account for utterance structure and for the complex meanings that signers intend and that addressees understand. Often this has to do with gesture spaces. Janzen, Shaffer and Leeson (2016) first introduced the idea of gesture spaces when describing relational elements—in other words, grammatical notions—in a three-dimensional use of space that constitutes the articulation space of signed language. In this panel, Cornelia Müller begins the discussion in “Revisiting gesture-sign continua: Continuity or discontinuity” by re-analysing “Kendon’s continuum” (McNeill 1992) in terms of gesture as having gradient properties, rather than the categories of Gesticulation > Language-like Gestures > Pantomimes > Emblems > Sign Languages being discrete. This sets the stage for other three presentations which all deal with gesture spaces. In “What I know is here; what



I don't know is somewhere else" Shaffer, Leeson and Janzen argue that a front-and-centre gestural space corresponds in both ASL and Irish Sign Language (ISL) to elements that are known, occur in the past or present, or are tangible, whereas further away spaces correspond to elements that are less tangible, unknown, hypothetical, or future or otherwise "irrealis" in nature. In Leeson, Shaffer and Janzen's paper "Does signed language grammar include gesture?" the authors expand on previous work to examine the specific nature of comparative gesture spaces that suggests systematicity in how signers of ASL and ISL incorporate gesture spaces corresponding to the point of comparison versus the focus of the comparison in such discourse. In the fourth paper, "Shared spaces, shared minds", Janzen looks at how ASL signers use gesture spaces to indicate past and present spaces within narrative structure, and how the signer-as-narrator situates herself within present or past spaces as a narrative, and intersubjective, device.

This theme panel thus explores a view of signed language and gesture that assumes at least some aspects of signed language structure are informed by gesture, explicitly in terms of cognitively salient gesture spaces and ways that these uses of gesture are critical components in how signers link both real and abstract times and spaces in their discourse.



Revisiting gesture-sign continua: Continuity or discontinuity?

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Starting from a point of view of gesture studies, this paper suggests that revisiting Kendon's (1988, 2004, 2008) and McNeill's (1992, 2000) reflections concerning gesture-sign continua and their resonances in current discussions, as for instance in Brentari and Goldin-Meadow's (2017) article "Gesture, sign and language: The coming of age of sign language and gesture studies", contributes to a clarification of the positions taken in that debate. A plea is made for distinguishing synchronic from diachronic perspectives and for carefully considering the criteria chosen to define gesture and sign, particularly in regard to what is considered gestural and what language-like. The goal of this talk is then threefold: 1) a critical evaluation of the gesture-sign continua and their role in the formation of gesture studies (including misconceptions and misunderstandings that they cause); 2) a revised version of the gesture-sign continuum, which may serve as background against which continuity and discontinuity approaches to gesture and sign may be more clearly positioned; 3) a proposal for gesture as a gradient property rather than as a category with clear-cut boundaries. A gradient concept of gesture allows us to see that the relation between gesture and sign is flexible and subject to constant changes: diachronically in terms of lexicalization and grammaticalization, and synchronically in terms of language contact between spoken and signed languages. Conceiving of gesture as a gradient property furthermore allows us to include hybrid forms of gestures and signs, which involve conventionalized and non-conventionalized features. The position developed in this paper is in accordance with the idea that both spoken and signed languages involve integrated gestural features (Brentari & Goldin-Meadow 2017; Janzen 2017; Kendon 2004; Vermeerbergen 2008), but it is countering the assumption of a harsh boundary between the two. The article concludes with an appeal to engage in (further) cross-linguistic research between gesture and sign language studies.



What I know is here; what I don't know is somewhere else

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When signers talk about things they know, they position those things in an articulation space that is directly in front of them in a central or slightly right-handed (for a right-handed signer) space. But when they talk about things they don't know—things unknown, in unknown locations, about unspecified referents, things in the future—these are relegated to other spaces. And so, a pattern emerges: specific gesture spaces associated with the here and now, the known, and past experience, and other more distant gesture spaces associated with the unknown, the distant, and the future.

In this study, we examine a number of regularized phenomena in American Sign Language (ASL) and Irish Sign Language (ISL) that consistently mark this spatially-articulated difference. Jacobowitz and Stokoe (1988) postulated that ASL does in fact have a future tense positioned in an upward and outward space, even though the analysis of this as a tense marker has not been substantiated. Nonetheless, it is common in signed languages for irrealis categories, such as future (Schaffer and Janzen 2016), to be articulated in an “other” space. Likewise, Shaffer (2012) has demonstrated that evidentials in ASL are semblances of interactions with unspecified others, and the spaces these occupy are frequently well off-centre to an “other” space, perhaps reflecting the non-specificity of the “other” with unquestioned authority. And in a study on motivated spaces for pronoun use in both ISL and ASL, Leeson, Janzen and Schaffer (2012) examined complex pronoun spatial placement that showed that conceptually remote referents were increasingly articulated toward locations farther and farther from a “front and centre” gesture space.

In this study, we analyse these occurrences as contributing to, and building, a distinction between 1) what is known, what is in focus, and what is presented to the addressee in a central shared space and 2) what is of the “other”—distant, unimportant, unknown, or irrelevant. In short, deictic spaces in this way are schematized at a complex, discourse level of information organization, such that the use of these systematic and schematicized spaces contribute to the intersubjectivized shared understanding of the significance of discourse elements by virtue of where they are positioned in signers' gesture space.

Does signed language grammar include gesture?

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The relationship between gesture and signed language has long been recognized, although the nature of that relationship is in some ways not very clear. Janzen (2006) has claimed, for example, that some researchers have taken a discontinuity approach, attempting to differentiate between what might be gestural material and what might be linguistic, while others have taken a continuity approach, asking not what the differences and the dividing lines might be, but about how the two might converge. Most recent work on grammaticalization in signed languages has shown that gestures are not only precursors to numerous lexical items, but are frequently sources in the evolution of grammatical elements (e.g., Author3 1999; Author2 2000, 2002; Wilcox 2007).

The implication of this is that even though many lexical items in signed languages have gestural roots, they aren't considered to be gestures any longer, and likewise even though grammatical components may have evolved from gestural sources, they are now fully linguistic. The present study, however, asks the question of whether or not a grammar system has room for elements that are still recognizable as gestures, and suggests that there are good reasons to think so. The implausibility of this argument in the past may have been based at least partially on limited understanding of the characteristics of both gesture and grammar in discourse. Presently though, it is not uncommon for studies on gesture and those on grammar taking a usage-based approach to use many of the same descriptors, such as ritualization (Haiman 1994) and schematicity – in grammaticalization (e.g., Bybee 2010) and for gesture (e.g., Ciencki 2013).

In this study, we explore the schematicization of comparative gesture spaces in American Sign Language (ASL) and Irish Sign Language (ISL), which was introduced by Janzen, Schaffer, and Leeson (2016), building on Winston's (1995) analysis of comparative discourse frames in ASL. We argue that in comparative constructions, comparative gesture spaces that appear somewhat more variable in gesturers (Hinnell and Rice 2016) have regularized as 'contralateral spatial gesture first/ipsilateral spatial gesture second' schematic structure, and it is this schematicization of the spatial gesture sequence that indicates the comparative frame, and thus participates in the grammatical structure of these signed languages.



Shared spaces, shared mind: Connecting past and present gesture spaces in ASL narratives

Terry Janzen¹

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In American Sign Language (ASL) narratives, signers build scenes in part by conceptualizing the scene space and mapping their discourse entities and actions in a relational version of that space onto their articulation space. Most often, the articulation space includes the signer and thus the signer's body, such that the signer takes on the various viewpoints of the characters in the narrative scene (Janzen 2004, 2006). These perspectivized enactments, then, are the constructions in the narrative sequence that push the action forward, and the spatial referencing represents a dynamic past space. But within narrative, the narrator also inserts descriptive passages, evaluates aspects of the unfolding event, and may check in with her interlocutor to make sure she is being understood. These aspects of narrative structure take place in the present between the storyteller and the addressee, and are interspersed throughout. As well, these parts of narrative are intersubjective in that they represent interactions between interlocutors that shape their joint view of the narrative story in which the narrator invites the addressee to share a similar perspectivization (Janzen 2012).

In this study, I look at how the ASL signer integrates these past and present gesture spaces, and in particular, integrates the viewpoints associated with each. Data are taken from an ASL conversational corpus where narratives are embedded within spontaneous conversation, thus the narrative scenes are based on conceptualized versions of actual past events. Importantly, the study shows that body partitioning (Dudis 2004) occurs at specific junctures. Body partitioning is where some parts of the signer's body correspond to one perspective-taking character and other parts correspond to a different character, actor, or participant. As the signer produces utterances in a gesture space corresponding to the present, directed toward the addressee, parts of her body—perhaps a hand, a bodily stance—maintains a past time perspective that corresponds to a past gesture space. In this way, multiple perspectives are presented simultaneously that intersect past and present. The usage-based data reveal that signers use a number of strategies to integrate past and present viewpoints, including not only simultaneously enacted stances and perspectives, but also differentiated utterance types – character viewpoints correspond to depicting sequences where the signer enacts past actions and talk, while a present viewpoint corresponds to utterance types such as topic-comment constructions where the topic phrase contains information the signer assumes the addressee can identify, thus it is an intersubjective marker of present space and present function.



Panel:

Gesture and its role in signed language emergence

Panel chairs: Olivier Le Guen¹ and Kate Mesh²

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Natural signed languages emerge in the contexts where they are needed: when deaf people in a community lack access to input in an existing visual-manual language, they and their hearing kin create such a language to meet their communicative needs. Research on emerging sign languages (ESLs) has focused on the variety of communities in which they occur, highlighting differences related to community size, geographic setting, social setting, and language ideology (Johnson 1991; Hou 2016, Kegl, Senghas & Coppola, 2001; Meir *et al.*, 2012; Nyst, 2012; Senghas, 2005; de Vos & Pfau, 2015; Zeshan & de Vos, 2012). These factors have been said to contribute to the variation in linguistic structures found in ESLs, and to the variety of timeframes along which these structures emerge.

It is frequently claimed that signed languages draw lexical material and even grammatical structure from gestures used in the communities where they form (see, e.g., Floyd, 2016; Nyst, 2016; Padden *et al.*, 2013; Janzen & Shaffer, 2002; Le Guen, 2012; Pfau, 2015; Pfau & Steinbach, 2006; Wilcox, 2007). While this claim is commonplace, little research has systematically investigated the contributions of gesture to ESLs, and to date, no research has considered how the diversity in gestural practices may actually relate to diversity in attested ESL structures.

This panel comprises field researchers investigating signed language emergence from multiple disciplinary perspectives. We assert that to make substantiated claims, it is crucial to document both the gestural practices in the communities surrounding the deaf signers as well as the signing conventions forming among deaf people and their co-signers. We use this panel as an opportunity to explore the relationship of gesture to ESLs, linking the diversity of gestural practices across cultures to the diversity of structures found in ESLs. Drawing from research performed in 5 languages across four continents, we consider the following questions:

1. What gestural practices are available to deaf signers of ESLs: what sorts of embodied communication do they witness and participate in?
2. Which gesture types do signers of ESLs recruit—is the diversity of gestural practices available to signers reflected in the practices they adopt?
3. How do signers of ESLs adapt gestural practices as they develop their linguistic systems—do the effects of gestural diversity persist as ESLs emerge?
4. What paths of grammaticalization do gestures take as they are integrated into ESLs? Are these grammaticalization processes universal or idiosyncratic to particular communities?

Our talks center around these processes in particular:

- Recruitment and adaptation of manual emblems
- Recruitment and adaptation of facial emblems
- Recruitment and adaptation of pointing
- Use of manual forms by bilingual-bimodals



We regard the panel as an opportunity not only to present research on the above processes, but also to reflect on and to present the methodology that we employ when conducting this research. Discussions of methodology, although fundamental, are often overlooked in studies of ESLs, and we use this panel to initiate a clear, thorough, and theoretically informed discussion of research methods in the investigation of gestural practices and their relation to the structures of ESLs.

Our discussion of methods will center on these issues:

- Prior documentation of gestural practices, ‘gestionaries’
- Surveys of speaker/gesturers
- Semi-structured interviews with signers, speaker/gesturers
- Video recordings of spontaneous spoken/gestured and/or signed talk
- Controlled elicitation of signing and gesturing

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From emblems to grammar: Gesture as a source for an emerging sign language in Mexico

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Emblems and co-speech gestures have been claimed to contribute to the lexicons of signed languages due to the visible overlap between these communicative repertoires (Janzen & Shaffer, 2002; Wilcox, 2004; de Vos, 2012). To date, there has been little research on how signers recruit and adapt conventional gestures in the local communicative ecology for their lexicons from a synchronic perspective (one exception is Le Guen, 2012).

Here we describe a study of *gestural analogues*—signs that share a form with conventional gestures—in San Juan Quiahije Chatino Sign Language (SJQCSL), a constellation of family sign languages in an indigenous community in southern Mexico. Many gestural analogues occur in the SJQCSL lexicon (Hou, 2016; Mesh, 2017): whether the meanings that gesturers and signers map to these forms are identical, and how signers learn them, are questions critical to understanding the contributions of gesture to SJQCSL.

To investigate the relationship of conventional gestures to SJQCSL, we collected data using the following methods:

- Field observations of spontaneous gesture use among hearing non-signers;
- Annotated video recordings of spontaneous gesture use among hearing non-signers;
- Responses to a gesture survey conducted with 40 hearing people: 35 non-signers and 5 sign languages users—following the methods of Brookes (2004), Johnson, Ekman & Friesen (1975), and Payrató (1993).
- Studying gesture dictionaries and previous documentation of gestures focused on Latin America (Meo Zilio and Mejía 1980; Shuman 1980).

Our early work focused on a small set of gestural analogues: five manual negators that have been observed in the communicative practices of gesturers and signers in the community (Mesh & Hou, in press). We found most form-meaning mappings for these negators were shared across gesturers and signers; simultaneously we found variation in the choice of using negators for clausal negation. An example is the TWIST-Y, which occurs in the region but has not been previously documented in gesture literature; not all deaf signers use this form for their negation strategies (Figs. 1, 2).

Preliminary analysis of other gestural analogues reveals an overlap between some conventional gestures and the family-based sign language varieties. Certain analogues, like the negators, are more recognizable in isolation with hearing non-signers. There is variation in how deaf signers adopt these analogues for their lexicons, suggesting that they learn them in the local communicative ecology and choose whether to adopt them or create their own signs.

This talk discusses not only our findings but also our methodology: we acknowledge the difficulty of documenting two interrelated visual-manual systems at once, and we discuss how our approach can remedy this challenge, presenting recommendations for future documentation of emerging signed languages.

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Person reference in Yucatec Maya Sign Language (Mexico)

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In this paper, we analyze two strategies to refer to person in Yucatec Maya Sign Language (YMSL), an emerging sign language that appeared in various communities in the Yucatec peninsula in Mexico. While the sign language was invented to communicate deaf individual, the great majority of the signing community is actually bilingual in Yucatec Maya and YMSL (and sometimes Spanish). Interestingly, although these different communities have not been in contact, they developed similar person reference strategies. We attribute these similarities, in part, to the cultural and linguistic background context of the surrounding community. Yucatec Maya speakers rely heavily on direct and metonymic pointing to refer to places and people (Le Guen 2011), and commonly use descriptions or personal anecdotes (as surnames) to refer to a particular individual (Hanks 2007). Both of these strategies are present in YMSL.

Our data were collected in two communities, Chicán and Nohkop. Sign names were elicited with signers and pointing strategies were collected from natural occurring interactions recorded on video. Three of the authors are members of the villages, and one is deaf.

First, we examine the way sign names are constructed in both communities considering names constructed on descriptions of physical appearance, characteristic behaviors, remarkable event, typical accessories, names built by association and generic names. We will also consider how, as it is the case among Yucatec Mayas, various names can be used simultaneously and how sign names can change or be temporary attributed. In the second part of this talk, we discuss the various types of pointing strategies used to make reference to present and non-present people especially direct and metonymic.

Our data show that, because it is a sign language, YMSL invented some strategies to refer to person in conversation but that it mostly recruited and adapted many existing strategies of the surrounding community.

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From gesture to sign: An intergenerational approach to negation in an emerging sign language

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Kata Kolok (KK) is an emerging sign language used by hearing and deaf members of a single village community in Bali. Hearing Balinese speakers often use a headshake and sometimes a hand gesture alongside verbal negation (Marsaja, 2008). This study investigates how these gestural expressions of negation have grammaticalised in KK across signers from generations III-V.

Cross-linguistically, sign language negation is expressed by both manual and non-manual elements: a lexical sign with side-to-side movement and a headshake are most common (Quer, 2012; Zeshan, 2004, 2006). Both markers are often used as co-speech gestures in the wider hearing community (Wilcox, 2009) and have grammaticalised into linguistic negation markers in sign languages. These vary along two parameters: 1) only one of the two markers (manual or non-manual) is obligatory, and 2) spreading of the headshake i.e. co-produced with only the manual negator or extending to neighbouring signs.

Transcription and analysis of 1.73 hours of conversational data from the KK Corpus (de Vos, 2016) reveals two main patterns: (i) Firstly, KK signers from generations III-V rely on formally identical negation markers that originate in conversational and cultural gestures (Marsaja, 2008): a lexicalized sign with side-to-side movement (manual negator), a negative headshake, and tongue protrusion. While the latter occurs in specialized negative contexts of negative evaluation and negative existence, the data did not unambiguously identify a single obligatory negator. The manual negator and the headshake are highly frequent, both combined and independent. This is typologically unusual since either the manual or the non-manual marker is obligatory in other sign languages. (ii) Secondly, we note inter-generational differences in the degree of headshake spreading, indicating language change across three generations: a linear mixed-effects model determines that younger signers significantly more often extend the headshake to neighbouring signs, while older generations co-produce it only with the manual negator (Fig. 1).

Pfau (2015) proposed that using the headshake as main negator is maximally efficient as it frees the hands for other signs. This system is attested in most sign languages studied that are considerably older than KK (Zeshan, 2004). The emergence of headshake spreading could indicate the development of this pattern. Nevertheless, headshake spreading in KK does not occur alongside a decrease in the manual negator and thus, the hand is actually not available for signing. Potentially, the youngest generation of signers represent a transitional state of the developing negation system.

The results from this study show that even within a relatively short timeframe, emerging sign languages like KK may draw on gestural resources to evolve unique and previously unattested linguistic patterns (de Vos & Pfau, 2015).

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When modality does not allow mixing: Bilingual-bimodalism in Yucatec Maya and Yucatec Maya Sign Languages (Mexico)

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Emmorey *et al.* (2008) argued that bilingual bimodals who use English and American Sign Language (ASL) tend to mix linguistic codes, i.e., use signs while speaking in English. Their proposal is based on the idea that a similar concept is built simultaneously in two modalities. The authors argue that for bilingual-bimodals, a similar lexical representation is activated within both the English and ASL and that because modalities do not interfere, signs (visual) can be used along with words (vocal). However, as the authors point out, more data are needed to confirm that this is a tendency among bilingual-bimodals cross-culturally.

This talk aims to show that the code-mixing is not a tendency of all bilingual-bimodals. Data come from a retelling task conducted with two bilingual-bimodal users of Yucatec Maya and Yucatec Maya Sign Language (YMSL), one from Chican and the other from Nohkop. The hearing signers were asked to retell the same set of videos, once in Yucatec Maya and once in YMSL. Results show that when telling the story in YMSL, signers were able to express all the meaning they wanted to convey and, when using Yucatec Maya, they gestured as others Mayan speakers who are not bilingual (***)).

Consider the following example: while the gesture in Yucatec Maya (Figure 1a) accompanying the speech “he first put his head inside” is produced loosely, the YMSL sign (Figure 1b) is done following the phonology of the verb TO INSERT in YMSL. Note that the sign is also accompanied by a non-manual facial expression (the lips of the signer are tightly closed).

These results, although limited, do show that there is no code mixing or code blending, and suggest that bilingual-bimodalism is realized differently across linguistic and cultural settings. We hypothesize that the difference between bimodal-bilinguals’ behaviors in the U.S. and among the Yucatec Maya relates to the role of gestures in talk in the two cultures. In English, speakers tend to use pragmatic gestures (Kendon 2017) and only limited gestures to complement speech semantically (Goldin-Meadow 2003). By contrast, Yucatec Mayas systematically and frequently complement their speech with information provided through the visual channel, even to the point that some gestures are indispensable to the communicative message (***)). Our proposal is that ASL comes as a more meaningful way to supplement speech than pragmatic gestures, while this space is already occupied by more semantically rich gestures in Yucatec Maya.

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“When you were that little...”: From Yucatec Maya height-specifier gestures to Yucatec Maya Sign Language person-classifier signs

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Yucatec Maya Sign Languages (YMSLs) are indigenous sign languages that emerged in Yucatec Maya (YM) villages with a high incidence of deafness. YMSLs are used by deaf and hearing community members, resulting in close language contact between YMSLs and spoken YM. This study investigates how conventional gestures of hearing YM become incorporated into YMSLs and undergo processes of grammaticalisation. Speakers of Mesoamerican languages use a range of “manual classifiers” (Le Guen, in prep; Zavala, 2000) with specific hand configurations assigned to specific classes of referents, e.g. animals or plants (Meo-Zilio & Mejía, 1980). These gestures are highly conventionalised across speakers and form important raw material for sign languages emerging in these communities.

Here I focus on a YMSL sign glossed SPEC-HEIGHT:HUMAN, performed with a flat 5-handshape, palm facing downwards. It derives from a common YM gesture that specifies the height of vertical entities (Fig.1). The height-specifier gesture adds semantic information to speech, and is often accompanied by the expressions *beya* ‘like that’ or *buka’aj* ‘of this size’.

Combining video data from elicitation, interviews, narrations and natural conversations collected from YMSL signers in four communities as well as non-signing hearing gesturers in another YM village, I analyse differences in form, meaning and function of SPEC-HEIGHT:HUMAN in gesture and sign language. Moreover, I look at inter- and intra-community variation.

In YMSL, semantic narrowing from a variety of vertical entities to exclusively human referents takes place. When indicating height – or analogically, age – of a person, the height of articulation of SPEC-HEIGHT: HUMAN in YMSL iconically depicts the actual measures of the referent and fulfils a similar discourse function as in gesture. The sign can also occur as a free lexeme, meaning ‘child’ or ‘younger sibling’. It is possible to localise SPEC-HEIGHT: HUMAN in signing space and to associate directional verbs with these locations.

Additionally, SPEC-HEIGHT: HUMAN can take on the purpose of a noun classifier (see Bergman & Wallin 2003 for Swedish SL) and be attached to a lexeme indicating gender or age, such as FEMALE+SPEC-HEIGHT: HUMAN ‘girl’ (Fig.2). Here, the form no longer reflects physical dimensions of a specific referent but is signed in a neutral location and classifies human entities generically. In the village Chicán, SPEC-HEIGHT: HUMAN is frequently incorporated into YMSL name signs, e.g. JOSÉ+FEMALE+SPEC-HEIGHT: HUMAN ‘Geli=José’s daughter’.

In its predicative use, form and function of the height-specifier gesture are preserved in YMSL – but as a noun classifier it takes on a new grammatical function and obtains a more fixed syntactic position. These observations parallel findings about YMSL constructions including a Size-and-Shape specifier (Safar & Petatillo, forthcoming) and provide valuable hints about sign language evolution from and beyond gesture.

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The use of space in Seychelles Sign Language (SSL)

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SSL is a sign language emerging as a result of contact between deaf signers living in the major island Mahé. It can be considered as a deaf community sign language (Le Guen to appear). There are less than one hundred signers, who have varying degrees of social integration. The lexicon is partially influenced by French and American Sign Language for two reasons: occasional contact with deaf people from La Réunion at sports events for instance, or with deaf tourists visiting the islands.

The Seychelles government decided to fund a development project to systematize SSL, from 2010 to 2018. This project aims to document and spread SSL through the publication of a dictionary and the use of SSL in various sectors of society.

My research was conducted within the frame of this project. Collected data come from video recorded interviews and discussions with 30 deaf adult signers. Like the majority of other emerging sign languages, (cf Meir 2010), SSL is related to natural gestures and cultural gestuality that complement speech in surrounding creole language.

This paper will follow the Meir proposal (2012) that suggests a correlation between spatial constructions and grammatical development, and will focus on spatial constructions in SSL. The following points suggest an analysis of transformation from gestural communication to linguistic signs within a signed language:

- The gradual use of pointing gestures with abstract functions : from direct pointing to real location of persons or places, to metonymic pointing to a location in signing space (Le Guen 2011) ; digital metaphoric pointing in the case of enumeration (the second one, the third one, for countable entities as persons, days, collections); from systematic pointing to a location in signing space attributed to a new reference, to occasional metaphorical pointing as personal anaphoric references, only used by a small set of signers ;
- The use of dynamic pointing gestures of one hand oriented away from the signer's body used as verbs of motion, both directed to a real location or to a location in signing space,
- The progressive lexicalization of constructed actions, becoming verb-phrases, and their use in systematic intransitive constructions: subject – verb. The body of the signer systematically refers to the subject. Transitive constructions are only used by a few people, with some verbs of relation.

These particularities are also mentioned by Nyst (2007) for Adabomore SL, or Meir (2010) for Israeli SL.

The signers of the Seychelles never use classifier constructions nor play roles. But they systematically adopt character perspective. Roleshifts, in the sense of 'perspective shifts' (Janzen 2004) and pointings appear to be at the origin of grammaticalization.

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Panel: African sign languages

Panel chair: Victoria Nyst¹

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This panel focuses on the study of African sign languages, which are underrepresented in the study of sign languages in general.

Whereas sign languages in some parts of the world are increasingly endangered, sign languages thrive in many parts of Africa. They are often used in large, flourishing Deaf communities, for example in the case of South African Sign Language. Members of the South African Deaf community also engage in creative forms of sign language use, such as stories and poems. Michiko Kaneko and Ruth Morgan discuss the use of gestural elements in such artistic forms of South African Sign Language. Atiyah Asmah will discuss another form of artistic language use, i.e. visual vernacular as produced by South African signers. Africa also hosts a relatively large number of emerging and/or village sign languages. Tano Angoua compares the L1 acquisition of negation markers by children of Deaf adults using either a village sign language or an urban sign language. In view of the diversity of African sign languages in terms of urban/village setting, emerging or established, locally evolved or of foreign origin, it is clear that expanding the study of African sign languages will contribute significantly to our understanding of sign language typology. Victoria Nyst presents a typology of colour terminology in over 30 African sign languages.



Gestures in creative South African Sign Language (SASL)

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This paper explores the role of gestures in creative sign language, focusing on poems and stories in South African Sign Language (SASL). This study is motivated by a recent incident in which a poem created by a Deaf poet was rejected for use as teaching material for Deaf learners based on the fact that it has “too many gestures”. Such beliefs that the gestural and linguistic elements can clearly be separated and that the former should be discouraged in ‘proper’ SASL texts are still prevalent. Through the analysis of 70 poems and stories, we will show that the gestural elements are an integral part of creative SASL, and that removing them is not simply impossible but would result in one component of meaning being entirely lost.

Since the 1990s, a modality-free notion of gesture has been proposed (McNeill 1992, Okrent 2002, Kendon 2008). Two criteria put forward to distinguish gestural and linguistic elements in both spoken and signed languages are *conventionality* and *gradience* - gestural forms are less conventionalized, more gradient and less categorical. Based on this paradigm, some elements of sign language, such as Constructed Actions, pointing, and agreement verbs, are considered to be more gestural than linguistic in nature (Liddell & Metzger 1998).

Moreover, gesture has been redefined based on meaning rather than on form. Gestural elements add a very different type of meaning to an utterance apart from its propositional content. This is called the ‘imagistic’ or ‘affecto-imagistic’ dimension of meaning (i.e. direct contact with sensory, motor, and affective information) as opposed to the analytic dimension of meaning (objective representation of meaning, a statement of fact) (Kita 1997, Okrent 2002). Such imagistic aspects of thinking expressed through gestural elements play a crucial role in creative sign language.

Instead of taking a ‘close-reading’ approach common in the analysis of the literary texts in sign language (i.e. to analyse a small number of texts in great depth), we have collected and analysed 70 poems and short stories in SASL, in order to see how gestures are used effectively across a number of creative texts in SASL. We will first identify the elements of gestures based on the criteria of conventionality and gradience. We will then discuss our findings regarding: firstly, the prevalence of gestures in creative SASL in relation to the use of the established lexicon, and secondly the unique role of gestures in poetic meaning-making.

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Defining Visual Vernacular in South African Sign Language (SASL): Exploration of how the visual vernacular form is represented in creative SASL

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This study explores the complex notion of ‘Visual Vernacular’ in South African Sign Language (SASL) and how it is represented in creative SASL (i.e. poems and stories composed and performed by South African Deaf signers).

In 1960, Bernard Bragg, an American actor and founder of the National Theatre of the Deaf, coined the term Visual Vernacular (VV), which is understood as a highly visual and kinetic form of expression in sign language, influenced hugely by cinematography. Instead of relying on established lexical items, a signer will use elements of roleshifts, classifiers, visual imagery, and cinematic techniques (such as zoom in and out, slow motion, montage, and so on) to deliver a story or a poem. Bragg (1995:20) mentions that VV has universal appeal to Deaf performers and audiences alike.

VV is based on the visual gestural modality unique to sign language. It especially plays a crucial role in sign language literature, which is defined by Sutton-Spence and Kaneko (2016:11) as “the literature of deaf people in the language of the deaf.” While elements of VV may appear in day-to-day signing, it is essentially seen as a *literary* and *performative* device.

VV has been introduced to the Deaf communities in America, Brazil, England and France, but it is yet to be introduced to the Deaf community in South Africa. Anecdotal evidence suggests that Deaf poets and storytellers in South Africa intuitively know how to tell stories using VV, but the precise definition and scope of VV have not been established. This study aims to explore the essence of VV in creative SASL, and how it is related to other terminologies that are more widely known in the South African Deaf community.

I will first clarify the notion of VV and other related terms such as *constructed actions* (Metzger 1995), *cinematographic techniques* (Bahan 2006), *classifiers* (Cuxac and Sallandre 2008) and *visual narrative* with the notion of “*tell, show and become*” (Sutton-Spence and Kaneko 2016). I will claim that VV can be understood as an ‘umbrella’ term that incorporates all of these elements in order to tell a visually coherent and effective story.

Then I will present my analysis of 20 poems and stories in SASL in which instances of VV have been identified. I will focus on the linguistic, thematic, and performative features that contribute to the establishment of VV as a unique art form in SASL. Lastly, I will present the views of Deaf poets and scholars toward VV in the South African context, based on group discussions.

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Deaf parents and their children's gestures and signs of negation: The case of rural and urban deaf families in Côte d'Ivoire

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Negation in sign languages is mostly expressed by manual and non-manual marks (Pfau and Quer 2002; Pfau 2015). The headshake is a non-manual negation which is originally the opposite of bowing to somebody symbolizing obedience (Jakobson 1972). Thus, according to Pfau and Steinbach (2013), the movement of the head to express negation in sign languages is a grammaticalized linguistic element from a gestural input. This study on negation is an analysis of gestures related to semantics. Six young children less than five years old were recorded in five families, where at least one of the parents is deaf.

Three families live in the village of Bouakako, where children are mainly exposed to Dida, the surrounding spoken language, and the local emerging sign language of the village (LaSiBo). Two other families live in the capital of Côte d'Ivoire, Abidjan, and use the Ivorian variety of American Sign Language (ASL-CI). These children are also exposed to French. All target children for this study are hearing so in a situation of bilingual bimodal development.

Children in general in their first negative constructions have uses relating to non-existence, rejection and also situations of avoidance. What are the semantic implications of negation markers such as, shaking index and head or shaking of body (trunk)? What are the differences that can be observed in these families living in different environments?

The corpus is composed of 30-minute recordings of interactions between children and their deaf caregivers through a series of home visits taking place once every six weeks from July to November 2017. Our first observation shows that in both Bouakako and Abidjan, negation is expressed in the same way by adults and their respective children as well as in the gestures of hearing non-signers. The signs to express negation lie in a continuum of gestures used by the hearing community in general and introduced into sign languages. In most cases, we have a shaking index, a headshake or a bodyshake (figure 1). For the latter, it has been noticed that it is exclusively used by children.

In one family in Abidjan, we also notice the use of an ASL-CI sign 'NOT' by both parents and the child because ASL-CI is the main language of communication between them. The target child already has an important knowledge of ASL-CI thanks to her age.

We conclude that to express the notion of negation, children use gestures rather than sign since these structures are common and frequently used in their environment by hearing non-signers.

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African Sign Languages and the typology of colour signs

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In a recent volume on the typology of colour terms in sign languages, Zeshan and Sagara (2016) conclude that there is a cross-linguistic tendency a) for colour terms high on Berlin & Kay's hierarchy of basic colour terms to be iconically motivated, and b) for initialized colour terms to be lower on the hierarchy. However, as the authors point out, only two out of the almost 30 languages compared for that study was an African sign language (Ugandan Sign Language and South African Sign Language).

This paper presents an analysis of colour signs in over 30 African sign languages. The study is based mostly on dictionaries, but also on first- and second-hand fieldwork data. Dictionaries usually do not present the full variety of colour signs present in a signing community. As such the analysis is preliminary. However, the advantage is that a large number of understudied sign languages can be included. This enables us to counteract the current, regional bias in our understanding of the typology of colour signs in sign languages.

A closer analysis of the signs qualified as iconically motivated may actually be referred to more adequately as indexically motivated. Thus, in many sign languages, colours high on the hierarchy are expressed by referring to body parts with a salient colour, such as touching, rubbing or pointing at the lips for red, or at the hair for black. The African colour data suggest that regional patterns in the coloration of body parts influences whether and which colour terms use conventionalized pointings to (which) body parts.

The sample of sign languages considered involves sign languages that have emerged locally outside the context of deaf education, as well as sign languages that have evolved around deaf schools, some of which have undergone considerable influence from or are even based on sign languages of foreign origin.

An analysis of the former type of sign languages (including the sign languages of Bouakako in Côte d'Ivoire, of Adamorobe in Ghana, of Douentza in Mali, and of Guinea Bissau) shows a surprising absence or unexpected distribution of pointing to body parts for colours. It also shows that language contact driving sign formation is also found in colour terms high on the hierarchy.

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Zeshan, U., & Sagara, K. (Eds.). (2016). *Semantic Fields in Sign Languages: Colour, Kinship and Quantification* (Vol. 6). Walter de Gruyter GmbH & Co KG.

Panel:

The timing and functional relations between speech and head behavior (nods, gaze, and facial gesture)

Panel chair: Eric Pederson¹

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Gesture and multimodality studies have only just begun to develop more complete models of the full repertoire of interactions between speakers and listeners. There have long been studies of the informative effects of “body language” (e.g., Schefflen 1964, Beattie 2003) and of course there is the now the broad field of gesture studies. However, there have been relatively few studies developing models of speech production which incorporate behaviors beyond speech and manual gesture (e.g., Kendon 1967, Dittmann, Allen & Lynn 1968, Hadar, Steiner, Grant & Rose 1983). There are also insufficient studies integrating the verbal and non-verbal behavior of listeners into a holistic model of communication. (e.g., Duncan 1975, McClave 1997, Bavelas, Coates & Johnson 2002, Kita & Ide 2007, Ishi, Ishiguro & Hagita 2014, Rossano 2012, Holler & Kendrick 2015).

Given the relative newness of research into these areas, there are still no agreed upon methods of data analysis. The four papers of this panel each address both the theoretical issues surrounding head movements, facial gesture, and gaze shifts as well as refining our quantitative methods – especially regarding apparent temporal coordination of head and speech behavior.

This panel brings together four different research labs in a conversation about what methods are most reliable, robust, and informative. We also discuss what we may and may not conclude from the temporal co-occurrence and adjacency of different behaviors across these modalities.

Complete abstracts for each presentation are provided separately, but we include here the general fit of each of the papers into a coherent theme. The logic of the sequence is first a study with just speaker data demonstrating the value of this focus on temporal data, second a broad study of speaker/hearer interaction looking at a range of multimodal behavior, and then two focused studies on interaction between speakers/hearers looking at head movements and gaze shifts.

1. Initial temporal relationship study:
House and Ambrazaitis examine the temporal relation between speech and head/facial gestures. They examine prominence, prosody and the functions of head and eyebrow movement in news-reading and spontaneous dialogue.
2. Broad study of interactional qualities of head gestures + gaze:
Stave and Pederson compare analyses of gaze and head movement timing between speaker and hearer.
3. Focus on the interactional qualities of head gestures specifically:
Brenger asks how do interlocutors time their head movement in response to their dialogue partner’s utterances and whether the varying intensity and frequency of head movement allow us to differentiate phases of discourse?
4. Focus on the interaction of gaze shifts between speaker and hearer:
Oben and Brône present a corpus-based study using eye-tracking data examining the multimodal grounding in interactional humor.



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Prominence, prosody and the functions of head and eyebrow movement in newsreading and spontaneous dialogue

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Prominent words and syllables are frequently conveyed in speech communication by a complex of multimodal signals involving both speech (such as focal pitch accents) and gesture (such as head nods and eyebrow movement). This study presents data concerning the frequency and temporal organization of head and eyebrow gestures and accented syllables obtained from two different data sources: television newsreading and spontaneous dialogue.

The television corpus comprises 31 brief newsreadings from Swedish Television representing four news anchors (two female, two male) containing 986 words (6.5 minutes). It was annotated for focal accents and head and eyebrow beats, independently by three annotators. A total of 233 head movements and 67 eyebrow movements were annotated. 165 head movements (71%) occurred with a focally accented stressed syllable. Two additional independent annotators marked the temporal location of the eyebrow movement related to the head movement. The locations of 51 eyebrow movements were agreed upon (Cohen's Unweighted Kappa 0.75) with 57% preceding, 41% simultaneous with, and 2% following the head movement.

For the spontaneous speech analysis, five-minute random excerpts of four dialogues (two female-male and two male-male pairs) were taken from the Spontal corpus of Swedish dialogue, a database of unrestricted conversation comprised of high-quality audio and video recordings and motion capture. The motion capture data enabled automatic detection of head movements resulting in a total of 1545 detected nods. Two annotators manually checked the automatic detection and classified the nods as simple or complex resulting in a total of 1054 simple nods. Syllable boundaries were annotated +/- one syllable from each simple nod and each syllable was categorized as unaccented, accented or focally accented. Of the 1054 nods, 422 stressed syllables occurred in conjunction with a nod (40%) of which 95 were unaccented, 130 were accented, and 197 had focal accent (Cohen's Unweighted Kappa 0.60). Only 19% of the simple head nods occurred in conjunction with a focal accent compared to 71% in the newsreading data. Eyebrow movement was annotated for each simple nod resulting in a total of 100 eyebrow movements. The locations of 78 eyebrow movements were agreed upon (Cohen's Unweighted Kappa 0.54) with 10% preceding, 76% simultaneous with, and 14% following the head movement.

These results indicate considerable differences between the two genres. In newsreading, we find a general temporal ordering of multimodal signals for prominence where eyebrow movement precedes head nods with both being anchored to but followed by a focally accented syllable. In the spontaneous dialogues, while we do find a number of similar instances of multimodal prominence expression, much head and eyebrow movement is not primarily related to prominence but rather has other expressive and communicative functions with manual beat gestures frequently assuming the predominant role of prominence signaling.



Methods for describing the temporal relations of multimodal behaviour

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Quantificational approaches to multimodal studies are growing in popularity -- allowing robust comparison of a range of behaviors across multiple participants and larger corpora. However, there remains a lack of established methodologies for multimodal data. This presentation compares multiple analyses (including *symmetric conditional probability* (SCP), *phi coefficient* (PC), and *adjacency histograms*) on a data set of forty dyadic storytelling elicitations. Specifically, we compare the onsets and offsets of speech, manual gesture, head gesture, and gaze shift for both speaker and listener occurring within a span of 1500ms of each other.

SCP describes the dependence of behavior boundaries given the counts of each behavior relative to the length of the storytelling session. The PC describes the strength of association between the observed and expected distributions of behavior boundaries across dyads. These two measures offer insight into the overall strength of the coordination of behaviors. As a way of further understanding this relationship, adjacency histograms allow us to more closely examine the distribution of the timing between behaviors, illustrating how closely timed the dependency is (the steepness of the histogram slope) and by how much one behavior precedes the other (the skew).

The mean SCP of all story-teller behavior boundaries coinciding with each other is 0.142 (out of a range of 0.016 – 0.235). In contrast, story-listener behaviors coincide with each other at 0.082. This confirms a greater overall temporal coordination for speakers than for listeners in this data set.

We can next examine specific behaviors across participant roles. For one example, the SCP of speaker gaze (towards the listener) with listener head gesture (backchannel) onset is 0.182, indicating strong temporal coordination between these speaker and listener behaviors. Looking at the adjacency histogram plotting listener head gestures to the onset of speaker gaze, we see two things: 1) a sharp increase (steep slope with a tapering decrease) of head nods indicating a targeted response of the head gestures to the listener gaze; 2) a skewed distribution of head nods centering around 200ms following the gaze shift indicating the tightness of this synchronization.

In contrast, when we examine the reverse relationship between the listeners' gaze (towards the speaker) and the speakers' head behavior, we find a much weaker effect: the SCP is only 0.093 (almost exactly half the previous effect). Similarly, the histogram is flatter and less skewed. Both of these analyses suggest listener gaze has less influence on speaker head gestures. This is consistent with the notion that speaker manual and head gestures are most closely coordinated with their own speech.

This and other examples confirm the value of these analyses for confirming expected results and in many cases revealing some unexpected behavioral correlations.



Using kinetic head gesture data to detect phases of strong or weak agreement in multimodal interaction

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How do interlocutors include their head movement, in response to their dialogue partner's utterances and do varying spatio-temporal features such as timing, intensity and frequency of head movement allow to differentiate phases of discourse?

To account for their diverse discourse functions, head gestures have been investigated with various methods and foci of analysis (e.g. Alexanderson *et al.* 2013; Heylen 2005; Kendon 2002; Wagner *et al.* 2014; McClave 2000). Furthermore, a motion-capture study on the use of head gestures in dialogic interaction (Brenger and Mittelberg 2015) has shown that dyads tend to modulate their head gesture behavior according to their respective, locally assumed role as speaker or listener.

Building on the methods developed in the named study, the motion-capture system has been retrofitted to track the direction in which the interlocutors' heads are facing. This allows us to approximate gaze directions, given that eye-tracking data it is not part of our corpus, but has proven to be a valuable source of information for the analysis of dialogue (Brône *et al.* 2014). In this way, it is possible to differentiate between "head towards interlocutor" and "head averted" automatically. We further adapted our methods to incorporate the timing of all head gesture occurrences in listeners in relation to speaker utterances. Additionally, the intensity of head movement is measured continuously by tracking the heads movement in terms of distance moved, velocity, and acceleration. The aggregation of these kinetic data streams allows us to identify phases of relative higher intensity in head behavior.

The discourse data used for this study stems from the Multimodal Speech & Kinetic Action Corpus (MuSKA). The analyzed sub-corpus consists of conversational data in which the dialogue partners had to agree on a travel itinerary for a joint trip through Europe. With the above-mentioned additions, we were able to further enrich the multimodal corpus data. Integrating the data streams with the annotated transcripts into a multimodal database allows us to correlate the spatio-temporal characteristics with the co-occurring discourse behavior such as turn-taking. In particular, the annotation is enriched by marking all occurrences of turn-taking and the introduction of new discussion points (e.g. travel destinations) by the speaker and the respective (dis-)agreement of the listener.

We hypothesize that we are able to identify phases of high intensity, with faster paced discourse dynamics and frequent role switching. These phases will be contrasted with phases of consolidation with reduced role switching. Moreover, we propose that such phases of higher intensity indicate a higher number of newly travel suggestions. We further suggest that occurrences of agreement and disagreement are reflected in the specific characteristic of the head movement.

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Multimodal grounding in interactional humor: A corpus-based study using eye-tracking data

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Studies in conversation analysis, cognitive psychology and linguistics have pointed at the important role of eye gaze as a grounding mechanism for both speakers and hearers (Kendon 1967, Goodwin & Goodwin 1986, Bavelas *et al.* 2002). For instance, gaze can be used by speakers to elicit and monitor response by the recipients in an attempt to establish or extend common ground in the interaction. Hearers, on their part, can establish and maintain eye contact with the speaker as a display of attention, engagement and understanding (Rossano 2012b, Holler & Kendrick 2015). Studies by Rossano (2012a, b) and others have shown that gaze behavior is partly dependent on the activity type participants are engaged in, where some activities (e.g. tellings) may require more sustained gaze than others.

In the present study, we zoom in on one specific activity in face-to-face interaction which requires particular attention in terms of multimodal grounding, viz. interactional humor. The different manifestations of this phenomenon, including teasing, joint fantasy and irony, all crucially hinge on the different participants' awareness of the layered nature of the speaker's communicative intent (Clark 1996, 2016): speakers set up multiple discourse layers (Coulson 2005) and may signal this (non)verbally (Tabacaru 2014). In this paper, we focus on the role of eye gaze as a grounding mechanism in interactional humor, using humorous turns (n=200) taken from a corpus in which the gaze behavior of all participants was recorded using mobile eye-tracking devices (Oben and Brône 2015). From the speaker perspective, we study gaze patterns as a feedback monitoring mechanism, allowing speakers to track the reaction from the different recipients in the interaction. From the perspective of the recipients, we are mainly interested in reaction monitoring between the recipients.

Our analysis is based on a comparison between the humorous turns and a random selection of non-humorous turns taken from the same corpus. The results show that:

1. There are more gaze shifts, both on the part of the speakers and the recipients, in humorous turns compared to non-humorous turns;
2. The synchronization of mutual gaze events between recipients is stronger in humorous turns in comparison to non-humorous turns, based on a cross-recurrence analysis (Coco & Dale 2013);
3. The higher frequency of gaze shifts (i) and stronger synchronization of gaze events (ii) cannot be explained by taking into account co-occurring (manual) gestures or posture shifts by the speakers, which might draw visual attention to that speaker.

In sum, this study shows that eye gaze functions as an active and highly synchronized instrument in face-to-face interaction, and its pervasiveness in interactional humor shows that this function is at least partly activity type-specific.

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Panel:

Iconic representation techniques scaffolding word learning

Panel chair: Katharina Rohlfing¹

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A growing body of research suggests a beneficial role of gestures in long-term language learning: Performing an iconic gesture together with a novel word facilitates more robust learning and makes those words more resistant against forgetting (see Hald *et al.*, 2015). Focusing on young children, Capone and McGregor (2005) commenced the examination of the relationship between toddler's gesture and speech as a function of semantic learning. The study was based on a vast literature evidencing that gesture provides a window onto emerging semantics. The window concerns the occurrence of gesture-speech combinations, information expressed in each modality (gesture and speech). While gesture and speech may express the same information that is accurate or inaccurate, they can also mismatch in a sense that the information provided through them differs. For school-age children, mismatch combinations can reflect "a knowledge state that is in transition to full understanding of a task" (Capone, 2007: 734). This state-of-the-art motivated a study, in which iconic gestures as a cue to semantic information during label training was in focus. Two techniques of iconic gestures were applied: one that depicts the shape and one that refers to the function of an object (see also Kendon, 2004; Streeck, 2008; Müller, 2014 for iconic representation techniques). The results supported the hypothesis that gesture, as a cue for semantic representation, influences word retrieval: Less scaffolding was necessary for word retrieval when words were learned within gestural presentation. Interestingly, the authors found that the two different iconic techniques, namely shape and function, led to different results in fast mapping but comparable slow mapping. They explain their results by shape being a statistically reliable indicator of an object's category (Capone & McGregor, 2005).

Further studies revealed that the semantic enrichment in form of gestures – in comparison to, e.g., pictures – enhances young children's learning of other word classes, such as spatial prepositions (McGregor *et al.*, 2009). In this slow mapping study, in which again not only the immediate but also a long-term effect on learning a new spatial preposition was investigated, the effect of gesturing was better than providing pictures, on which the desired spatial relation was visible. The authors conclude that gestured input promoted more robust semantic knowledge by reducing the cognitive load during training while emphasizing the target location as well as the necessary movement that is requested to perform the relation.

It becomes obvious that the current literature interprets the advantage in terms of representational structures recruited for verbal tasks: Children who experienced new words embedded into a gestural presentation have richer semantic representations (Capone Singleton, 2012) in the form of a dense semantic network as a product of the experience (Capone & McGregor, 2005). These dense networks then facilitate further learning, because the strength of connections becomes stronger and new words can be better embedded into the already existing network (Capone Singleton, 2012; Horst, 2013).

Not only for L1 but also for L2-learners, it has been shown that that gestures and especially their reproduction can improve the memorization of lexical items (Kelly *et al.* 2009; Macedonia & Knösche 2011; De Nooijer *et al.* 2013). From these L2 studies, however, little is known about the influence of different iconic techniques on word learning.



The panel presents a comprehensive empirical exploration of the role of different iconic representation techniques for word learning. With four studies to be presented in the panel, we cover both children and adults as target learners. Besides directly comparing the effect of different iconic gesture types for word learning, we also investigate effects of reducing the iconic form in gestures used in word memorization. Further, we take the role of learning content into account by considering different word types, hypothesizing that different learning effects with different iconic techniques might depend on the word classes that is the learning content.

As a methodical innovation, some of the studies to be presented in the panel employ intelligent artificial agents. Conducting gesture studies with artificial, embodied agents such as virtual humans or humanoid robots allows for the pure experimental manipulations of gesture use which is impossible to achieve by live or video-taped experimenters/confederates (*cf.* Cook *et al.* 2017). At the same time, such agents can be integrated into technology-enhanced learning environments, thus, representing a flexible way to provide learners with adequate verbal and non-verbal/gestural input that can be adjusted to the individual needs of the learner. In fact, a growing body of evidence shows that virtual humans or humanoid robots can be used to scaffold learning processes in different domains by using gestures (Bergmann & Macedonia 2013; Cook *et al.* 2017).

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Can the reduction of an iconic gesture aid long-term learning? A pilot child-robot-study

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This study focuses on the iconicity of a gesture, which nature is to capture only selected elements of the referent. Studying preschool children at the age of 5, we asked whether they will learn new verbs and nouns more robustly when they experience a changing (experimental group) vs. stable (control group) gestural presentation during their slow mapping process (i.e. long-term word learning). Both groups started their learning by being exposed to the new words that were embedded within a story that a robot (NAO) told to the children: Already at this stage, the robot was performing iconic gestures corresponding to the new labels. The novel words and the form of the gestures were motivated by a similar study interested in iconic gestures helping children with specific language impairment (SLI) to learn words (Vogt & Kauschke, 2017). After being exposed to the story embedding the novel words, children of both groups were tested for comprehension and retention. Two more learning sessions followed, to which we applied the different training conditions: In the experimental group, thus, on two subsequent sessions, the gesture provided to the children that was accompanying the new words, was successively reduced. We reasoned that because reduced movements (also dubbed “marking”) require less cognitive resources than fully executed movements (Warburton *et al.*, 2013), observing reduced iconic gestures might lighten the cognitive load. These reduced cognitive resources could enhance children’s ability to learn new words resulting in a more robust ability to name new words in comparison to children from a control condition, in which full iconic gestures were observed. At the same time, we assumed that observing reduced iconic gestures could also have a positive effect on the motor areas of the brain as compared to fully executed gestures when it comes to understanding words (Kirsh *et al.*, 2012).

In this pilot study, we tested so far 10 children (5 in each condition). To test the production task, the robot asked the children to name a picture that appeared on the tablet. For the comprehension performance, the children were requested to select the target picture among three others on the tablet. We found that in the production task, during the third testing session, the experimental group was able to recall $M = 1.4$; $SD = 1.47$ words while children in the control group were able to recall only $M = 1.0$; $SD = 1.35$ words. During the fourth testing session, children in the experimental group recalled $M = 1.7$; $SD = 1.45$ words while $M = 1.0$; $SD = 1.35$ could be recalled in the control group. Because of the small sample, this difference in production of novel words is statistically not significant, but bears a medium size effect ($r = 0.25$), on which we will further build when pursuing this investigation. The performance in the comprehension task was similar in both groups—a no-effect of iconic gestures that is known from the literature (e.g., McGregor *et al.*, 2009).

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Iconic gestures improve second language tutoring by a social robot

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Recently, increasing effort has been made to develop social robots as second language tutors (Kennedy *et al.*, 2015; Belpaeme *et al.*, 2015). One reason why robots could be effective tutors is that they can produce gestures in the real world that may support language learning. Various studies have indicated that iconic gestures can aid first and second language learning by adults and children (e.g., Kelly *et al.*, 2009; Macedonia *et al.*, 2011; Tellier, 2008). This effect has not only been observed for learning from humans, but also from virtual avatars (Bergmann & Macedonia, 2013). Question is whether this can be replicated using a humanoid robot with limitations in its abilities to produce human-like gestures?

We address this question as part of an experiment that also investigates the effect of adaptive tutoring on second language learning in a 2x2 between subjects design: gesture vs no gesture, and adaptive vs non-adaptive (details of the adaptive conditions are beyond the scope of this paper). We recruited 61 native Dutch-speaking children (4-6 years old) to learn 6 nouns (animal names) in English. SoftBank's NAO humanoid robot was used and the interaction was mediated using a tablet computer. Children played 30 rounds of the familiar game 'I spy with my little eye...' at their preschool. Each round the robot named one of the 6 target words in English (the rest was said in Dutch). In the gesture condition, the robot produced an iconic gesture depicting either a shape or function of the target animal. During each round, drawings of the target animal and one to three distractor animals were displayed on the tablet. At the end, the child was asked to touch the animal she/he thought was intended and feedback was provided.

The effect was measured using a pre-test, an immediate post-test and a retention-test one week after the training. All these tests were exactly the same. The child sat behind a laptop, hearing a female native English voice produce each target word while a different set of drawings of all six animals were randomly positioned on the screen. The child was asked to click on the animal she/he thought was intended.

All conditions combined, there was a significant learning gain for both the post-test and the retention-test. No significant differences between pre-test and immediate post-test were found for all conditions. Another two-way ANOVA testing the difference between pre-test and retention-test revealed no difference for the adaptive tutoring condition. However, it did reveal a significant difference for the gesture condition, $F(1,57)=6.11$, $p=.02$, showing that gestures had a positive effect on vocabulary learning after at least one week. So, iconic gesture use by a humanoid robot can have a positive effect on vocabulary learning by children.

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The role of iconic representation techniques in gesture-enriched vocabulary learning with a virtual tutor

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Memorising lists of vocabulary is an essential part of second language learning. Performing an iconic gesture together with the novel word pair may enhance its initial learning and long-term recall (e.g. Allen 1995; Kelly *et al.* 2009; Macedonia *et al.* 2010; Macedonia & Knösche 2011; De Nooijer *et al.* 2013; De Nooijer *et al.* 2014). The underlying mechanisms are not fully understood, but recent evidence suggests that the specific type of gestural representation can make a difference, e.g., Kushch *et al.* (2016) showed that form-depicting observer-viewpoint gestures were more effective than action-depicting character-viewpoint gestures when learning Catalan-Russian noun pairs.

The present study aims to transfer Kushch *et al.*'s (2016) findings towards artificial pedagogical agents. Artificial agents, such as virtual humans or humanoid robots, allow the precise experimental manipulation of gestures that is impossible to achieve by live or videotaped experimenters/confederates (*cf.* Cook *et al.* 2017). Previous research showed that gesture-enriched vocabulary learning with a virtual tutor is comparable to learning with a human tutor in terms of learning outcome (Bergmann & Macedonia 2013). Crucially, such agents can be integrated into technology-enhanced learning environments, thus, representing a flexible way to provide learners with input that can be adjusted to learners' individual needs.

We conducted a vocabulary learning study with a virtual human and manipulated gestures' representation technique (Kendon 2004; Streeck 2008; Müller 2014). 27 participants learned a total of 15 Finnish-German noun pairs accompanied by either drawing gestures, pantomimes or in a control condition without gestures. In the gesture conditions, participants imitated iconic gestures performed by the virtual human. Gestures were semantically congruent with the to-be-learned words. During training, word pairs were presented three times in blocks according to the experimental condition. The order of the blocks and the order of the word pairs within a block were randomised. Participants' learning performance was measured with free recall tests after the learning session (immediate recall) and two weeks later (delayed recall).

Both, immediate and delayed recall tests results showed significant main effects of the gestural representation techniques on recall rates of L2 words (immediate recall: $F(2,52)=16.72$, $p<.001$, $\eta_p=.39$; delayed recall: $F(2,52)=21.03$, $p<.001$, $\eta_p=.45$). Pair-wise comparisons revealed that participants recalled significantly more words that were trained with drawing gestures than with pantomime gestures or without any gestures. Thus, enhancing the presentation by gestures does not always improve the learning success. This implies that just using a virtual human in technology-enhanced tutoring systems or multimodal lectures is not sufficient. In order to effectively enhance the learning success, they have to be carefully crafted. Specifically, drawing gestures improved the learners' immediate and long-term recall for nouns, whereas pantomime gestures did not. Furthermore, our results substantiate the importance of differentiating techniques of iconic representation.

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Seeing iconic gestures helps three-year-olds learn verbs

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It is challenging for young children to identify a novel action verb's referent in an ostensive context, that is, when they are presented with a novel label ("Look! He is daxing!) and a scene that includes the referent action plus many other things (Quine, 1960). In order to do so, they have to be able to separate the features of a scene, and isolate the referent (McGuire, *et al.*, 2008; Imai *et al.*, 2008). For instance, children need to understand that intransitive action verbs such as swimming refer to manners of movement, and not to the actor carrying out those actions. However, three-year-old children wrongly assume that both manner of movement and actor are important parts of the verb's meaning (e.g., Imai *et al.*, 2005). We will report two studies that demonstrate that seeing an adult's iconic gesture depicting the referent action helps 3-year-olds identify the referent of verbs.

First, seeing an iconic gesture depicting the referent action helps 3-year-olds map novel verbs to specific referents (Mumford & Kita, 2014). One-hundred-and-twenty children were taught verbs that could be interpreted as change-of-state (e.g., to make sand into a stripy pattern) or manner verbs (e.g., to push sand with fingers), while presented with either manner, end state or no iconic gestures. Children were then presented with a choice that forced them to generalise either on the basis of manner or end state. Results showed that children who saw manner gestures showed a significantly stronger manner bias compared to the other groups ($p < .004$). Thus, the specific feature of an event encoded in gestures guides children's interpretations of novel words.

Second, seeing an iconic gesture helps 3-year-olds not only correctly identify referents of individual verbs (e.g., manner of movement), but also develop item-general knowledge about verb meaning (e.g., action verbs tend to refer to manner) (Aussems & Kita, in preparation). In the first half of the experiment, forty-eight children were taught verbs referring to manner of motion either with iconic gestures depicting the manner or with interactive gestures (e.g., showing surprise), and then asked to generalise the verb to a new scene that shows the manner of movement by a different actor. In the second half of the experiment, both groups were taught a new set of manner verbs with interactive gestures, and carried out the same generalisation task. We found that (1) children who saw iconic gestures correctly generalised significantly more verbs than children who saw interactive gestures ($p < .001$), and that (2) the iconic-gesture group outperformed the interactive-gesture group even in subsequent trials, in which all children saw interactive gestures ($p = .001$). That is, iconic gestures help children develop general strategy for learning verbs.

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Panel: Gesture politics

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The international rise of populist leaders, from Duterte in the Philippines to Donald Trump in the U.S., arguably magnifies the performative aspects of public political discourse, especially as these leaders recruit their bodies for theatrically persuasive speech in ways that violate local norms of decorum. When Donald Trump imitated his opponent's physical weakness during the presidential campaign, he violated norms separating the spheres of politics and entertainment and thus ran afoul of moral conceptions of political discourse reaching back to classical antiquity. One aim of our panel is to explore these newly emerging (or re-emerging) modes of bodily performance in the political sphere, to ask whether and how they constitute a change in the embodied dimensions of political communication, and to seek out commonalities, if any, across cases. Is populism, for instance, made manifest routinely through violations of 'refined' bodily comportment and through distancing oneself from the bodily aesthetics of 'conventional' politicians? Are such populist aesthetics being taken up by others, perhaps affecting what it looks like to communicate "politically"?

While these questions concern the empirical bodily actions of politicians in interactions with co-interactants and audiences, the other concern is 'the gestural' as a dimension of political action, notably by politicians in positions of power. Here we understand 'gesture' in its wider, everyday sense, referring to decisions or actions that may or may not involve physical action but that convey social meanings in ways comparable to some ('pragmatic' or 'metacommunicative') gestures of the hand, such as gestures of dismissal, revulsion, aversion, embrace, etc.—gestures, in other words, that display a stance or attitude towards a theme and/or the addressee, but they may also be 'category-bound' to, and embody, the position of power that the maker holds. A prime example of a political act embodied as a physical one and thus signifying in the way of gesture has been Trump's throwing of rolls of paper towels at Puerto Ricans after hurricane Irma.

By bringing together these two intertwined dimensions of 'political gestures' and/or 'gesture politics', the panel finally aims to restore some of the analytic power and reclaim some of the relevance of older, 'gesture-based' methods of observing and criticizing political speech and action and show how a principled critical analysis of their gestural actions can support the critical political observation of politicians.



Gesture politics: An old agenda and some new examples

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Political processes have always included modes of signification that can be called ‘gestural’: actions performed and events staged in ways that a broader contextual meaning becomes encapsulated in a single form or action; and meanings conveyed are of kinds that are similar to what is conveyed by certain manual gestures: aptitudes claimed, propositional attitudes, stances, including adulation, condescension, contempt, and so on. ‘Gestural’ political actions range from the stylization of a politician’s gait, and the stylizing imitation of another politician’s gait (Corbeill 2004), to the giving of gifts during state visits (Mauss 1966), to a Green Party politician’s wearing of sneakers at his swearing in ceremony, to German chancellor Brandt’s knee fall at the site of the Warsaw ghetto. Hand gestures such as the Roman *imperator*’s extended hand and the Hitler salute that was modeled after it (Brilliant 1963; Allert 2008) have served as unique, pervasive embodiments of power, distinct icons of distinct regimes. The systematic observation, description, and critique of gesture politics is, presumably, as old as its conduct. The golden years were those of the Roman republic, which Quintilianus (100) witnessed as chief critic of its rhetorical practices (Streeck 2008).

It appears that the recent rise of populist leaders, who aim to ‘talk directly to the people’ by bypassing conventional formats, language, and institutions, is accompanied by an increase in the production of—or at least greater attention to—political gestures (*cf.* Ingram, this panel). This raises the question what our now established field, gesture studies, can contribute to the documentation, description, analysis, and critique of the gestured politics of our time. The aims of this paper and the panel that it is designed to open are to raise this question and to promote the investigation of populist political communication by gesture researchers, as well as to work towards a workable definition of ‘gesture’/‘the gestural’ in the context of political action, performance, and communication.

The cases discussed in this paper to measure the range of ‘gesture’ and to assess what analytic apparatus is needed to explicate the workings of contemporary gesture politics are taken from the Trump and Duterte presidencies (Trump’s document signing performances; his throwing of paper-towels at hurricane victims, among others; Duterte’s cursing; his self-presentation and -enactment as assassin).

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Mimesis on the campaign trail: How Clinton and Trump personified one another

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In American political oratory, politicians use depictive language to create ‘visual’ narratives that they hope will make audiences envision the political reality they advocate. But they also make use of their bodies to create visual narratives. During the 2016 presidential election, American audiences were engrossed in visual impersonations as comedians, everyday Americans, and even the politicians themselves consumed and produced bodily caricatures of the two presidential nominees: Democrat Hillary Clinton and Republican Donald Trump. But there is, to date, only a limited amount of scholarship that has explored how politicians break away from the normative political decorum to impersonate, as if they were actors or comedians, political competitors, journalists, even voters.

In previous scholarship, Hall, Goldstein, and Ingram (2016) explored how Donald Trump used an unconventional political style (pantomiming and nicknaming of his opponents) as comedic weaponry. Building on Hall *et al.*'s article and studies of gestural depiction (Calbris, 2011; Clark, 1996, 2015; Müller, 2009, 2010, 2016; Streeck, 2008, 2009), the current paper provides a micro-analytic account of how Donald Trump and Hillary Clinton create theatrical contrasts of one another.

Examining a large corpus of Trump and Clinton rally speeches, I look at examples such as how Clinton impersonated Trump ‘lurking’ at one of the presidential debates or Trump mocked her over-use of teleprompters, as a form of pictorial labeling (Goodman, 1968). We find that these gestural impersonations vary widely in type and depictive elaboration, falling into different mimetic categories of pantomime, caricature, and ironic portraiture. This paper explores how gestural mimesis depends on synechdocal and metonymic processes (Mittelberg, & Waugh, 2014) that simplify or distort; magnify or rebuke; and vilify or magnify those being impersonated (Basso, 1979; Burke, 1984).

These techniques of gestural representation operate as strategic, iterable performative skits (Osborn, 1986) that become meaningful in interactions with rally audiences. I argue that mimetic performances create shared interpretive schemas of one’s political opponents and supporters. By framing impersonations in this way, we can use micro-analytic methods (e.g., Bull, 2003, Wells & Bull, 2007) to study how performative spaces in American politics are changing and what method gesture studies scholars may turn to as a way of studying them.

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Poetics and populist aesthetics in political gesture

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Verbally, political oratory is renowned cross-culturally for its pragmatic exploitation of what Roman Jakobson classically termed “the poetic function,” which manifests itself as all manner of metricalized “repetitions” and “parallelisms.” But what of the poetics of cospeech manual gesture in such discourse environments? To what extent does gestural poetics matter in political gesture? Based on research on pragmatic gestures (especially precision-grip and index finger extended handshapes) drawn from several US presidential campaign cycles (Lempert 2011, 2013, 2017, In Press), I suggest that in the mass-mediatised debates and speeches of presidential campaign politics, poetically dimensionalized manual gesture is not only pronounced but has become a basis for gestural *enregisterment*, that is, for constituting ‘political gesture’ as a distinct mode of embodied communication. Less a register based on form-functional conventionalization, the “political” in political gesture is enregistered instead by its treatment of poetics as a (if not the) measure of rhetorical “effectiveness” and “eloquence.” After considering how gestural poetics has helped enregister political gesture, I turn to the populist aesthetics embodied by politicians like Donald Trump. Although this aesthetics is often framed as ostentatiously anti-political and anti-rhetorical—as if it represented a sharp break from the communicative styles of other candidates and incumbents—I suggest that gestural poetics remains intact and unquestioned as a multimodal aesthetics of persuasion.

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How Politicians Ideologize Difference through Multimodal Viewpoints

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In American politics, politicians entertain audiences with dramatic speeches that attempt to foster intimacy, involvement, and trust. In the process of telling these parable-like stories, politicians evoke citable characters (i.e., political adversaries or allies) as a means of making a particularly persuasive point. Cognitive linguists and researchers in gesture studies have amassed substantial literature on the way interlocutors take up different multimodal viewpoints (character, observer, or dual) or narrative roles through the culmination of various linguistic, discourse, and gestural devices (see Parrill, 2010; Stec, Huiskes, Redeker, 2015). Switching between different viewpoints enable viewers/hearers to imagine what a character (self or other) is perceived to sound or act like in relation to a real or hypothetical scenario. While scholars rightfully examine the cognitive, mimetic, and iconic dimensions of viewpoints (visuospatial and motoric properties of gestural depiction), the current study conceptualizes viewpoint in rhetorical and anthropological terms.

As narrative studies have shown (Bamberg, 1997; Koven, 2007), viewpoints are also perspective-taking devices. When politicians animate political figures (Goffman, 1974) through the use of linguistic, prosodic, or gestural devices, they do so while taking up implicit and explicit stances towards the animated figures (Günthner, 1996; Hoenes del Pinal, 2011). In this study, I further the idea that multimodal viewpoints can also encode the speaker/gesture's moral viewpoint and evaluative judgments of the character being depicted (Osborn, 1986). In particular, I examine how Donald Trump (an entertainer-politician) and Hillary Clinton (a mainstream politician) have very different dramaturgical strategies for enlivening characters in their dialogues.

For my analysis, I use a micro-analysis of politics to examine short iterable dramatic segments that were repeated a large corpus of campaign speeches. By examining moments where the same characters are animated, I argue that we learn more about how characters are ideologized through and with the body. The point I make is that viewpoints can also be used to index different moralizing qualities, mannerisms, or characteristic about a cited figure, and in doing so, politicians often create contrasting images intent discrediting the ethos of another (D'Eririco, Poggi, Vincze, 2010). Following Irvine and Gal (1995), I consider the way depictions can be used to ideologize the bodies of other. For instance, acting as a political adversary in dialogue, politicians can use this depictive moment to make essentializing indexical arguments about a person's public faults, and thus, they can use viewpoint as a means to rationalize and justify their critiques of others. In part, I attempt to intervene in scholarship on viewpoint by turning our attention to more persuasive dimensions of viewpoint depictions as they serve as part of a broader rhetorical goal.

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Panel: Multimodality and sensorality: Insights from interactions involving deafblind people

Panel chair: Louisa Willoughby¹

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While the study of multimodality in interaction continues to grow in popularity, Mondada (2016) notes that it has largely been explored as a visual turn, focusing on the visual resources (such as pointing and gaze) that participants use to structure their interactions. In this panel, we take up Mondada's call for more research that explores the ways in which non-visual and non-auditory multimodality is experienced and utilised in interactions, focusing on the experience of people who are deafblind. Part of our interest is in showing the ways that participants reinscribe visual information – such as non-verbal cues like nodding – so that it is accessible to deafblind interlocutors. However, we also argue that in many instances it is not that the form of utterances changes to accommodate deafblind participants, but that deafblind participants are picking up on cues that are always present in spoken or signed interactions. In this way, we argue that looking in detail at communication between deafblind people can help analysts become aware of interactional resources that are in fact present and potentially relevant in all interactions, but that have tended to escape our notice because of the logocentric and visual focus of much interactional research to date.

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Displaying listenership in deafblind tactile signing interactions: Bodies in motion

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The multimodal turn in interaction studies has seen increasing interest in recent years in how participants in interactions draw on corporeal resources – including nodding, gaze, facial expression and corporeal repositioning – to show active listenership in conversation (Mesch 2016; Mondada 2011; Knight 2011). Displaying listenership becomes particularly challenging for people who are both deaf and blind and communicate via tactile sign language – where the ‘listener’ places one or both hands on top of those of the ‘speaker’ in order to follow what is being signed. Deafblind signers do not have visual access to the corporeal resources for displaying listenership mentioned above, but nor do they have auditory access to minimal responses like *mhmm* or *really?* that are also commonly used to display listenership in spoken interaction (Holmes, Marsden & Marra 2013; Farr 2003).

In this paper, we consider the ways in which experienced users of Tactile Auslan (Australian Sign Language) display active listening in interaction in our corpus of 10 hours of interactions. Like other tactile sign languages around the world, tactile Auslan users use a variety of hand taps and squeezes to show that they are attending to the discourse (see e.g. Collins & Petronio 1998; Mesch 2001; Raanes 2011). However, we argue that this is not the sole resource that they are drawing on. The body contact and physical intimacy engendered by tactile signing transmits a range of cues between listener and speaker that can be interactionally meaningful, from the lightness/ heaviness of touch and the fluidity with which one tracks the signing of the speaker, to small changes in grip or pressure that indicate body movements such as nodding or head turning. Tactile signing draws our attention to the potential communicative role of these small bodily movements, and particularly what the quality of how a movement is performed (fast/slow; tense/lax etc) may say about a listener’s stance within an interaction.

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How do deafblind people share their stance? A comparative analysis of expressing laughter in tactile Japanese sign language and finger braille interactions

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Tactile sign language is normally used by those who were born deaf or lost their hearing at an early age, and then lost their sight after acquiring a sign language. These people are known as Deaf-based deafblind (D-deafblind hereafter). Finger braille is popular in Japan but largely unknown outside that country. It is normally used by those who were born blind or lost their sight at an early age and subsequently lost their hearing after learning how to produce speech using their throat and mouth. We call these people blind-based deafblind (B-deafblind hereafter).

This paper gives a comparative analysis of how laughter is expressed in D-deafblind and B-deafblind interactions. I draw on transcription methods from Multimodal Interaction Studies (Mondada, 2007) in discussing the temporal and sequential position of laughter in both types of interactions.

When hearing people tell a funny story, they try to show that they consider it funny, namely stance, in various ways, including smiling, using a high-pitched voice, or acting as a character in the story (Stivers, 2008). D-deafblind people who use tactile sign language for their everyday conversations can use haptic cues - such as by scratching their arm with their weak hand while simultaneously signing with their dominant hand – as a way of showing laughter. This is a very rapid way of expressing their stance regarding the story and normally occurs simultaneously at turn-endings. We also observed that, when some tactile Japanese sign language (JSL) learners forgot to add haptic laughter in their humorous utterances, skilled interpreters added an explanation that the learner had been laughing while signing by using tactile signing after their conversation.

In comparison, B-deafblind people who use finger braille for their everyday conversations have a linear or sequential way of expressing laughter. Finger braille was developed by Prof. Fukushima (B-deafblind) and his mother. Finger braille users and interpreters tap three of the B-deafblind person's fingers, the index, middle, and ring fingers, of both hands, like tapping on a braille typewriter in a mora-by-mora manner. They tap all three fingers after the final particles in the sentence to show that the interlocutor is laughing; this is not synchronized with the turn-ending features. In many cases, finger braille learners tap only letters slowly in a mora-by-mora manner, without including laughter. In such cases, it is difficult for a B-deafblind person to understand their stance regarding the story.

Instead of drawing a conclusion, this paper only introduces the method used to show a stance in tactile JSL and finger braille interactions. However, these cases provide an opportunity to consider how important it is to show a stance so that the “listener” can follow the storyline and share the storyteller's stance attitude.

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When nonverbal behavior is interpreted: Strong orientation toward embodiment in finger braille interpretation

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This paper discusses how skillfully finger braille interpreters participate in interaction, employing the concepts of footing (Goffman, 1981), especially focusing on their conveying nonverbal behavior. In Japan, some deafblind people who can speak use finger braille to understand what others are saying. Finger braille is used in two ways; directly “talking” with deafblind people or drawing on its interpretation. Finger braille interpretation is an activity in which interpreters convey what the interlocutor is saying or responding to the deafblind, by tapping the recipient’s six fingers, i.e., the first, second, and third fingers of both hands, in a mora-by-mora fashion.

Interpreted-mediated conversations between deafblind people and hearing/sighted people contain many different or additional features to what is normally seen in interpreted interactions between spoken languages or visual sign languages. This is in part because the deafblind cannot see the interlocutors’ bodies. When interpretation is performed for sighted people, they have access to the interlocutor’s nonverbal behaviors by themselves, i.e., nods, gaze direction, facial expression, body movement or posture, and only rely on interpretation to access the interlocutor’s vocal utterances. Deafblind people, however, have little or no visual access to this information, so part of the interpreter’s role in this context is to provide interpretation of nonverbal behavior.

In this paper, we explore these issues with a particular focus on nods and laughter, demonstrating several cases from a video-recorded interview between a deafblind interviewee and a hearing/sighted interviewer, also attended by two interpreters. Finger braille interpreters often convey nods or laughter produced by the hearing/sighted, simultaneously tapping several of the recipients’ fingers, once or twice for nods, and several times for laughter. As for vocal or signed interpretation, interpreters are not necessarily expected to convey interlocutor’s nonverbal behaviors, since the recipient has access to them vocally and/or visually. However, regarding finger braille interpretation, it is crucial for the interpreters to convey interlocutor’s nonverbal behaviors when relevant. A particular challenge for interpreters is separating out the reporting of the speaker’s stance from what might be seen as the interpreters’ own assessment of the speech – especially since laughter is almost always authorized by the speaker him/herself, even with reported speech (Goodwin, 2006). Additionally, interpreters seem to convey almost all nods but not all laughter, and we will also consider how they decide which behaviors to convey.

Under the specific circumstance, finger braille interpreters must be embodied messengers of the speaker, conveying not only linguistically uttered but also bodily expressed messages (*cf.* Goffman, 1963). This fact implies that the practice of finger braille interpreters is cognitively hard in that they have to continuously recognize speaker’s bodily orientation repetitively changed. The practice of finger braille interpretation is, therefore, strongly oriented to embodiment as well as linguisticness.

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Hand positions for showing speakership: A report of language selection by the deafblind man

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In this paper, we compare and contrast how three different types of signed dialogue: deafblind-deafblind, deafblind-deaf and deafblind-hearing, are organized in embodied social interactions. Especially, we focus on participants' hands position which shows speakership to the ongoing interaction. The video clips that we analyze were recorded during a site visit organized by a Deafblind club. We focus on one deafblind man, who is one of the leaders in the club. He had several exchanges with club members (deafblind, deaf, and blind) and their hearing interpreters (hearing) in quick succession. Our analysis indicates that the deafblind man selectively uses visual Japanese Sign Language (v-JSL) or tactile Japanese Sign language (t-JSL) depending on the recipient's abilities. As the result of this analysis, we suggest that the deafblind man tends to show his speakership to the ongoing interaction with v-JSL by using different hand positions, specifically whether or not he holds his hands on where the hearer could touch.

Mesch (2001) suggested that deafblind users of tactile Swedish sign language use different hand configurations for tactile reception depending on whether the interaction is primarily monologic or dialogic. In our data, we do not note this kind of contrast. However, when using v-JSL our focal participant made use of hand position within the signing space as a way of indicating whether his utterance would be continued or provide the opportunity to take a flow for conversation with the hearer.

By showing speakership to the conversation, a speaker could display how his/her utterance should be understood, and which response, visible or tactile, would be appropriate to it. This is important to unfold their interaction. Goodwin (2013) shows that participants in conversation use various non-linguistic resources to manage their unfolding interaction, including bodily movement and environmental cues. While gaze has been widely studied in sign linguistics, many other non-linguistic cues have received limited attention in this modality, and remain under-explored in deafblind contexts. Our paper thus aims to shed light on how deafblind signers negotiate the limitations and opportunities provided by the tactile modality, and how bodily movement might differ depending on the recipients' level of vision and/ or hearing.

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Oral Presentations

Articulatory relationships across Sign Languages

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This research has two goals. One, we describe lexical items in sign languages using articulatory features. Two, we compute over these features to identify language families. Thus, we provide proof of concept that quantitative methods can be used to probe typological and historical classifications of sign languages, along the lines of what has been done recently in spoken language phylogenetics. (Nichols 1992, Dunn *et al.* 2005).

To establish a shared baseline for cross-linguistic comparison, we used Woodward's (2000) sign language adaptation of the Swadesh list, items that represent core concepts of human experience. Data from nine sign languages (Austrian-OGS, Brazilian-LIBRAS, British-BSL, French-LSF, German-DGS, Italian-LIS, Portuguese-PortSL, Spanish-LSE, Turkish-TİD) were sourced from an online dictionary (<http://www.spreadthesign.com/>) and articulatory features (55 handshapes, 36 locations, 11 movements) were manually coded using a system modeled after Brentari (1998). Figure 1 illustrates the coding system.

Two analyses have been performed on the data: a cluster analysis to identify the language groups in the data and a principal component analysis (PCA) to identify the articulatory features driving these groupings. Figure 2 shows the language groupings resulting from cluster analyses; the PCA is illustrated in Figures 3 and 4. Cluster analysis identifies three main groups: (1) LIBRAS, LIS, and LSE (2) LSF, DGS, OGS, and (3) BSL and TİD, with (4) PortSL as an isolate. The PCA identifies seven significant components and indicates that BSL and TİD cluster together as a result of handshapes with bent base nodes; LIBRAS, LIS, and LSE as a result of frequency of 'local' movement (i.e., handshape and orientation change). PCA also provides insight into the 'sub-families' within the main groupings; DGS and OGS cluster together due to a high proportion of one-handed signs and very few signs produced on the horizontal and lateral planes.

Documentation of historical relations among sign languages (Ethnologue) would place LIS, LSE, LSF, and LIBRAS as part of the same linguistic set. DGS and OGS should also be closely related, while no relation is documented between BSL and TİD. PortSL is not historically related to any other languages in the set. Statistical analysis of articulatory features may align well with historical predictions – for example, isolating PortSL and clustering DGS and OGS. In some cases, however, articulatory comparison diverges from historical predictions, as in the grouping of LSF with DGS and OGS or the clustering of BSL and TİD. We suggest that the latter may be influenced by the fact that BSL and TİD are the only languages in the sample that use a two-handed manual alphabet. Nevertheless, we see that as in spoken languages, quantitative typological classification of sign languages is possible and may partly overlap with historical relations.

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Source-Goal asymmetries: Where do they come from and what parts of communication do they get to?

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Paths are central components in motion events (Talmy 1985) but not all paths are ‘equal’. Compared to goal paths, source paths are more structurally marked (Fillmore 1997), tend to be introduced as adjuncts (Nam 2004), and are less likely to be included in spoken descriptions (Lakusta & Landau 2005). Here, we ask whether this asymmetry diminishes when information in gesture is considered. Information in speech and gesture may be redundant or supplementary (de Ruiter, Bangerter, and Dings 2012; Goldin-Meadow 2003) and the spatial nature of gesture may make it particularly apt for providing supplementary source information. In the present study, adults viewed and described simple motion events (e.g., *a woman runs from a garbage can to a pillow*) with or without speaking (i.e., silent gesture). Responses were coded for the inclusion of source (*from a garbage can*) and goal (*to a pillow*) in both speech and gesture.

Across conditions and modalities, sources and goals were frequently included in event descriptions (61% sources vs. 76% goals; two-tailed, paired t-test, $p=.002$). When looking at the information conveyed only in speech, however, there was only a marginally significant bias to encode goals, replicating Lakusta and Landau (2005). To assess whether gesture may be used to provide supplementary information, we examined the 2466 descriptions involving both speech and gesture. There were only two instances of event component information being included in gesture only (1 source, 1 goal). Thus, adults did not use their gesture to provide supplementary information, including supplementary information about sources. Goals were, however, significantly more likely to be *redundantly* encoded in both speech *and* gesture ($p=.01$). Similarly, goals were also associated with gesturally richer representations (.26 average source gestures per description vs. .40 goal gestures; $p=.007$).

When produced without speech, the properties of gesture change (e.g., Goldin-Meadow *et al.* 1996). This is also true in the present study. For example, subjects in the silent gesture condition produced more gestures on average than speaking subjects (2.22 vs. 1.22 gestures per description). However, subjects in the silent gesture condition did not exhibit a significant goal-bias. Silent gesture descriptions were not more likely to include goals ($p=.442$), nor were their goal descriptions significantly richer (.34 source gestures vs. .42 goal gestures, $p=.438$).

The present study provides evidence that sources remain vulnerable in co-speech gesture and are not included as supplemental information, whereas goals are robustly encoded across modalities. When asked to produce gestures *without* speaking, however, goals are not significantly more likely to be included. Thus, conceptual and communicative biases may not be as prominent in all forms of communication.

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Educator's awareness of their gestures during a pedagogical activity taken place in a museum

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Our work on the "Arts de Faire" aims to study the ways in which professionals in education, training and cultural mediation act in contexts of knowledge transfer, scientific information transfer and cultural pedagogical activities. Indeed, the professional development of educators implies the identification of their professional activity and in particular the gestures that could accompany them. Until now, the professionalization of cultural educators was targeted on the techniques of transmitting content. But we hypothesize that the action of the educator is primarily in the establishment of interactions between the content presented, the visitor and the museum context. These interactions could make more understandable complex objects to each visitor. Then the educator has the role of being at the level of the knowledge and the expectations of the visitors to accompany them in this learning process.

We will present two situations implemented by educators, one at the Musée des arts et métiers, the other one at the Louvre-Lens. In each situation, the body plays a role of mediation with the public and our analysis will focus on the perception of each educator on his own activity and his professional gestures. In the case of Louvre-Lens, an interview with the educator before seeing himself bringing biographical elements and the researcher's observations highlighted other gestures.

Our theoretical approach is based on the work of Mauss and on our own work in the field of education on the professional action of the teacher and the trainer, considering that the cultural mediator's action could be close to that of the trainer. Our conceptualization of professional action includes four categories of professional gestures: language gestures, gestures of staging of knowledge, gestures of adjustment of the activity and ethical gestures.

The research methodology consisted of meeting the educator at the place of his activity, filming it, then viewing this film and conducting a self-confrontation sequence as defined by Clot. Our approach attempts to identify: an articulation between the professional gestures of the social actor and the singular subject that the cultural educator has to be at once, or in turn, as soon as he is engaged in a professional situation; a common culture specific to this profession (Clot, 2000) as well as indicators of the style of each educator; an analysis of the posture: body and professional gestures.

We offer a perspective hardly addressed when we talk about professionalization. The primacy of the discursive and that of expertise seem to relegate to the background the part of the corporal expressing (body and professional gestures) in social action. This led us to rethink the terms of corporeality, the "Arts de faire" (suggestion of translation: arts of doing), professional (s) gesture (s) and posture.

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What does graph segmentation and description tell us about speech-gesture-referent relation?

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Graphs are smart designs that carry specific messages by employing Gestalt principles of visual perceptual organization. They provide static snapshots of dynamic events that unfold in time. A successful comprehension of a graph relies on effective segmentation. Segmentation occurs at locations where perceptually or conceptually the highest changes occur (e.g. Tversky, Zacks and Hard, 2008). Graph schemata tell that the regions that present a high amount of change in space correspond to events that have abrupt changes in its action stream. Besides the perceptual changes, data-labels also help a reader in segmentation. In this study, I focus on the effect of data-labels on parsing and describing the graph by analyzing the use of modifiers and speech-accompanying gestures.

The experiment was conducted with 32 participants in two conditions (*between-subject*). In the first condition, the stimuli contain the graphs with data-labels, while in the second condition, the graphs do not have labels. After inspecting each graph for 10 seconds, the participants were asked to present a single-sentence summary of it. Each participant was presented twelve graphs. The angle between the line and the x-axis, so the steepness of the lines (*within-subject*), restricted to 0° ('no change'), 15°, 45° and 75° ('steep change').

With or without labels, the graph readers split events into similar numbers of sub-events. Moreover, the number of the representational gestures was not affected by the presence of data-labels. The slope of a segment, had a strong effect on whether that location is chosen as an event boundary or not. In other words, the steeper the slope is, the higher the chance of the segment to be selected as an event boundary is and higher the gesture production rate is. Furthermore, a segment can be referred with or without using any modifier, i.e. "It decreases (fast)". The use of modifiers significantly differed across conditions. While the participants in the first condition referred to the segments without a modifier, the opposite pattern was observed for the second condition. In both conditions, more gestures were observed for the phrases with modifiers, although no main effect of data-labels was found.

This indicates that data-labels that link perceptual information to conceptual information have no significant effect on how the readers segment, however how they refer to differs across conditions. The results are in line with existing literature that suggests that contrasting properties have high saliency, and this locates them to the focus of attention leading more gestures for them. (Hostetter and Alibali, 2008; McNeill, 2008). The lack of data-labels makes the readers focus more on perceptual changes and compare them with other contrasting segments instead of connecting them to time domain and thus the discourse context manipulated by data-labels affects gesture production.

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Posture for gesture during an instructive task in Kansai Japanese

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Postural shifts tend to be made on topic shifts in a conversation (Erickson and Schultz 1982). And there are various body parts that can be shifted to change postures (Kendon 1972). For example, when a body trunk moves, the postural shift made then seems great while one can move only their head to show a small shift. When a conversationalist shows these shifts, they can be related to the degree of engagement to the conversation (Goodwin 1981).

In this study, I will show the connection between postural shifts and mode shifts in the conversation and the gradation of engagement to the on-going interaction that can be seen through postural shifts by participants. For analysis, I employed the data of a two-party interaction, in which one person applied make-up on another. In this type of interaction, there is a rather clear shift between the mode of instruction or explanation and that of talking on more general topics. The make-up doer, who is an amateur, explains about make-up processes and cosmetic products and tools that she uses on her make-up doee, immediately before or during one make-up process.

In the process of using an eyelash curler, she demonstrates how to use it, facing her make-up doee. Because the make-up doee claimed that she had never used the tool before, the make-up doer shows demonstrative motions, using many illustrative gestures which describe the changes the tool makes on the eyelashes. In this case, the make-up doer never turned away from the make-up doee. The motions she made here were instructive.

In the process of applying mascara, the makeup doer turns away a little from the makeup doee, mimicking a mascara applying motion on her own lashes. Though her face and torso turn away from the doee, her body trunk is still and does not step back from the position she keeps. The motion she made here seems not very instructive to the other but seems like for her own understanding of the motion. This nature of the gesture may cause a half-way disengagement from the interaction.

There was a phase where the make-up doer showed a greater disengagement with her body trunk turning away from the make-up doee fully. It was shown during the preparation phase of the mascara application. In that phase, she noticed its package is not clean. While removing some stains from it, her left side of the body faces the other participant.

These cases illustrated the effect that postural shifts can have on the transition between the modes of interaction and general talk. And they also showed the gradation of engagement can be cued by what parts of the body are used in postural shift.



Seeing iconic gestures promotes lasting word-category knowledge about verbs in children

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Preschool-aged children benefit from seeing iconic gestures during verb learning, when these gestures depict the actions to which the verbs refer. Iconic gestures facilitate verb learning by highlighting the components of events that are important for verb meaning (e.g., wiggling the index and middle fingers to depict *walking*). As such, iconic gestures promote *word-specific* knowledge of individual verb meanings (i.e., a verb refers to the action depicted in iconic gesture). However, it remains unclear whether iconic gestures can also facilitate *word-category* knowledge about verbs (i.e., verbs typically refer to actions), which children can use in subsequent verb learning. This study investigates whether the benefit of seeing iconic gestures during verb learning is limited to word-specific knowledge of individual verbs, or extends to word-category knowledge about what verbs are.

We developed a word learning task in which we taught preschool-aged children two sets of novel verbs for unusual actions performed by actors shown in videos. We manipulated the gesture type (iconic vs. interactive) that children saw when the first set of verbs was taught. Iconic gestures depicted how the actors moved and interactive gestures did not depict any aspect of the events, but engaged the children in the interaction. All children saw interactive gestures when the second set of verbs was taught. Immediately after a verb was taught, children were required to extend this verb to one of two videos on a split screen: one showed the referent action performed by a novel actor and the other showed a novel action performed by the actor who children had seen when the verb was taught.

Children who saw iconic gestures were more successful in extending the verbs to novel events showing the referent actions than children who saw interactive gestures. More importantly, the iconic-gesture group outperformed the interactive-gesture group even in subsequent trials that were administered immediately (Experiment 1, $N=48$) and after a one-week delay (Experiment 2, $N=48$), in which all children saw interactive gestures when a second set of different novel verbs was taught.

The real-world benefit of seeing iconic gestures on verb learning is not always clear, because people do not produce an iconic gesture with every utterance. However, this study shows that iconic gestures do not merely promote word-specific knowledge of individual verb meanings, but also lasting word-category knowledge about verbs, which children can use for subsequent verb learning, even in the absence of iconic gestures. Importantly, iconic gestures helped children to *generate* word-category knowledge about verbs, because they did not encode word-category knowledge about verbs, but word-specific knowledge of individual verb meanings. Thus, seeing iconic gestures has a more far-reaching impact on verb learning than was previously thought. Iconic gestures help children figure out *how* to learn verbs.



Pointing gestures and locative deixis: an analysis of the deictic *aqui* ‘here’, in Brazilian Portuguese multimodal data

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In this talk, we aim to compare the form, meaning and function of the Pointing Gestures that co-occur with verbal utterances of the deictic “aqui” (here) in multimodal data from Brazilian Portuguese videos. These data were collected from three different samples: Sample 1 is composed by occurrences from TV News, collected at the Distributed Little Red Hen Lab, Sample 2, by occurrences from a TEDx motivational lecture “Felicidade é aqui e agora” (“Happiness is here and now”), and Sample 3, by occurrences gathered from the Lula’s (Brazilian former president) Deposition to Judge Sérgio Moro. Firstly, we explored the deixis in more and less prototypical contexts. Our discussions were centrally based on the concept of Idealized Cognitive Models, as originally proposed by Lakoff (1987), and then explored by Marmaridou (2000), specifically regarding the deixis phenomenon. More specifically, we verified how this concept can be applied to Gesture Studies, in multimodal contexts of occurrence of the deictic “aqui” (here). Then, we discussed about the Pointing gestures (Kendon, 2004), that occur in prototypical verbo-gestural occurrences of “aqui” (here). We also discussed about less prototypical (and more metaphoric) occurrences of the analyzed deictic, taking into consideration the different Gesture Modes of Representation (Müller, 2013) that co-occurred with the speech in metaphoric verbo-gestural compounds with the deictic “aqui” (here). To describe the gestures, we have used the Linguistic Annotation System for Gesture (Bressem, 2013), which establishes the four parameters for gesture description: handshape, palm orientation, movement direction and position in space. Furthermore, to establish if the analyzed occurrence was more or less prototypical, we applied the Metaphor Identification Guidelines for Gesture (MIG-G; Cienki, 2017), in which the four parameters for gesture description correspond to steps 1 and 2 of the Procedure. After that description, we verified the physical referent depicted on the gesture (step 3), and if the depicted referent corresponded to the referent vehiculated on the speech (step 4). If so, the multimodal occurrence was not considered as metaphoric. If not, or, in other words, if the speech contextual topic was abstract (x the physical referent depicted on the gesture – step 5), the multimodal occurrence was considered as metaphoric (step 6). Results showed that the predominant Pointing Gesture was the PDPIF (Palm down, Prone Index Finger), that corresponds to the Iconic description established as “pointing down”. This gesture was pervasive: it occurred in more and less prototypical occurrences, as well as in occurrences categorized as “in-between” ones. In these “in-between” occurrences, there is a mix-up between Pointing Gestures and Gesture Modes of Representation. Finally, for the less prototypical occurrences, we made explicit the inter-relation between gestures and speech, and, as a result, we described the multimodal metaphors that emerged.

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Embarrassment laughter in the discourse of linguistic adaptation

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Laughter, and especially ‘embarrassment laughter’ is an important means of bodily communication performing a variety of functions which depend on the culture, genre and type of discourse. In this aspect, laughter belongs to the means of multimodal communication, as much as gestures do. In this paper, I look at the instances of laughter that happen in the recordings of life narratives where the narrators tell about their experiences as bilinguals. Based on the Goffman (1967) ‘social order maintenance’ theory and Chafe (2007) ‘non-seriousness feeling’ approach I look into the functions of embarrassment laughter. There are at least five specific functions that the embarrassment laughter realizes as part of the interactional dimension of the discourse:

1. Apologizing for the use of stereotypes and expository (explanatory) type of discourse passages;
2. Dissatisfaction with the produced discourse;
3. Disclaiming own conceptualizations and verbalizations;
4. Politeness strategies compensating for breaking norms and expectations;
5. Attempts to present a situation as humorous.

The data for this study is a pilot corpus of nine Russian-language life narratives recorded from people who speak Russian as their second language or who are heritage speakers of Russian. The question that initiated their stories was as follows: “Could you please tell how you ended up speaking Russian?”

The data was gathered as part of a much broader project ‘Languages of Moscow’ where we study linguistic and cultural diversity of a metropolis (<http://languages.msk.ru/en/>). The narratives were classified according to a few parameters: reasons to study Russian, age when Russian was first studied (acquired), degree of satisfaction, recurring topics, and recurring formal features. Of the latter, the embarrassment laughter was most conspicuous and happened at those moments in discourse production when the narrator was discussing sensitive issues – values and norms, among them.

As we showed in our other publications, the functions of the embarrassment laughter may overlap for different discourse communities. In narratives by people with aphasia, those will include failure to produce an appropriate linguistic form, failure to produce an appropriate interpretation, and dissatisfaction by the narrative when laughter at the end of an episode or the story can be explained as the embarrassment of the speaker regarding the quality of their retelling. In the paper, I will discuss specific features of embarrassment laughter as markers of the communicative situation and type of discourse taking place using a broader corpus of Russian-language narratives of linguistic adaptation (another 30 stories).



Seeing turn transitions from the perspective of the unaddressed participant: a case study of question-answer sequences in Flemish Sign Language

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Conversation analytical research shows that interlocutors negotiate speakership systematically, and thereby minimize the occurrences of gaps and overlaps. Turns-at-talk consist of one or multiple turn constructional units (TCU's) and at the end of a TCU turn transition becomes relevant (e.g. Sacks, Schegloff and Jefferson 1974). Through online processing of the unfolding turns-at-talk, interlocutors can not only recognize, but also anticipate upcoming turn ends.

Evidence for this online-processing of turns-at-talk can, for example, be found in experimental studies using eye-tracking. Keitel *et al.* (2013), for example, found that participants watching a recorded conversation tend to shift their gaze from the current to the next speaker within a time window of 500 ms. before the end of the current speakers' turn and the beginning of the next speakers' turn. Edlund *et al.* (2012) and Hirvenkari *et al.* (2013), by contrast, report that the non-involved viewers tend to shift their gaze at the next speaker, only after the next speakers' onset.

Based on these contrasting results, but more specifically because the existing studies involved observers in an experimental setting rather than actively engaged interlocutors, Holler and Kendrick (2015) conducted a study on unaddressed participants' gaze behavior during question- response sequences in face-to-face interactions. Results show that most gaze shifts occur before the end of the current speaker's turn. However, if questions consist of multiple turn constructional units, the unaddressed participants plan their gaze shifts only 40 ms. before the first possible completion. Holler and Kendrick (2015) therefore conclude that unaddressed participants do not anticipate, but rather orient to turn ends and as such "optimize reciprocity" for both the current and next speaker's turn.

Due to the visual gestural modality of signed languages, it might be even more important for unaddressed participants to anticipate the end of the current speaker's turn, i.e. to avoid missing the next speaker's onset. The current study therefore provides a first fine-grained analysis of unaddressed participants' gaze behavior during question- answer sequences in a signed language interaction. The dataset for this study consists of 7 triadic Flemish Sign Language (VGT) interactions. The conversations were recorded with external cameras and participants were equipped with mobile eye-tracking devices (Tobii Glasses 2).

Results show that unaddressed participants tend to plan their gaze shifts before the next speaker's onset. Noteworthy here, is that most gaze shifts were also planned before the end of the current speaker's turn, i.e. before the end of the question. However, if questions consist of multiple turn constructional units, gaze shifts were only planned and launched after the end of the first TCU, i.e. after the first possible completion. This is contrary to Holler and Kendricks' findings, since they found that unaddressed participants plan their gaze shifts just prior to the first possible completion.

As the end of the turn was defined by the stroke of the last sign, we found that signers can already recognize the end of the current speaker's turn before the latter returns to rest position.



Our results therefore seem to support findings from e.g. Casillas *et al.* (2015), who suggest that signers orient to stroke-to-stroke boundaries, rather than the turn-final retraction.

Further qualitative analysis will provide more insights in the linguistic cues affecting the timing of these gaze shifts.

Does mouthing influence the comprehension of lexical signs in French Sign Language? Evidence from a priming experiment

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Sign languages are gestural languages but linguistic information can also be conveyed by vocal components such as mouthings. Mouthing usually tends to reproduce the more relevant phonetic part of the equivalent vocal word matching with the manual sign. One crucial issue in sign language processing is to understand what function mouthing may have, i.e. to what extent they contribute to the construction of the signs at a phonological or semantic lexical level. The present pilot study aimed to investigate the role of mouthing on the processing of French Sign Language (LSF). In particular, our goal was to examine whether mouthings combined with manual signs do influence in a way the comprehension of these signs. For this purpose, we designed a repetition priming experiment with 5 Deaf individuals who had learned LSF at different ages. We created five experimental conditions in which the combination of both the manual sign and the mouthing was systematically manipulated (*Condition 1*: both manual signs and mouthing matched; *Condition 2*: the signs were combined with the mouthing of a pseudo-word; *Condition 3*: the signs were associated with the mouthing of a sign belonging to the same lexical category; *Condition 4*: signs without mouthing; *Condition 5*: mouthing alone, i.e. without manual sign). Participants performed a lexical decision, i.e., they had to decide as fast as possible whether a picture matched with the sign presented. Descriptive data showed that while signs combined with the appropriate mouthing were processed the most rapidly, the slowest decision times were observed for signs presented with the mouthing of a pseudo-word (interference effect). Interestingly, the processing of signs without mouthing as well as mouthing without signs were lengthened, but to a lesser extent than conditions in which a mismatch was present between the signs and the mouthings. Taken together, the data of the present pilot study lend support to the hypothesis that mouthing might constitute one unity with the manual sign, and might be integrated into it. Further investigation should be conducted for consolidating the present preliminary data using a larger sample of Deaf individuals with different learning trajectories of LSF.

TYPANNOT, a new glyphic system to annotate handshapes in any sign languages

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There are two main systems of transcription for sign languages (SL): SignWriting [1,2] and HamNoSys [3]. Each of them have been designed for different yet complementary purposes. The first system is oriented towards communication, focusing on readability and using a strong logographic approach. The second one is oriented towards analysis, focusing on searchability and using a strong phonographic approach. Both transcribe the form of signs with a symbolic glyphic system, instead of glosses [4] using vocal glyphic systems. Each of them can be appreciated in their own use and purpose but this separation reveals the incapacity so far to combine both qualities in one system: phonographic searchability and logographic readability.

Our aim is to solve this semiotic dichotomy by designing a new highly modular system that can answer the needs of all existing 142 SL [5] around the world (and virtually any SL) to transcribe the handshapes. The development and the use of this system relies on a new graphematic formula and modern typographic technologies such as Opentype and Robofont glyphs automatic generation capacities. The transcription, employing various digital interfaces (virtual keyboards and gestural interfaces), use a modular glyphic structure that allows to stack several levels of description (phonologic [6] and phonetic [7,8]). This system can be actually displayed in two forms, a phonological decomposed sequence (generic form) or a logographical assembled symbol (composed form) in a totally transparent way for the annotator via a universally available opentype functionality (contextual ligatures). The entire list of possible glyphs is very large (tens of thousands), so the keyboard allows to choose the handshapes present in a specific SL, constraining the list to the repertoire of each SL. Once the typographic font is installed on a computer, it is available in any software including ELAN or ANVIL. We developed a graphic visual interface and also a real time gestural recognition (LEAP motion MoCap device [10]) tool to facilitate the selection of the glyphs. The user will be able to actually annotate the signs by gesturing. In this communication, we will present how the font and the devices (virtual keyboard and MoCap interface) work together.

Finally, the ratio between annotating time and duration of corpus is one of the well-known problems in annotating SL. We will discuss this ratio on French SL corpora, at different levels (generic vs. composed glyphs) and with the said devices. Results make the case for the use of our annotating system including the MoCap input.

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Conversational movement dynamics and non-verbal indicators of second language development: A microgenetic approach

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A relational developmental worldview has become increasingly recognized in the field of developmental research as an alternative to the cognitivist tradition and was used in the current study. This perspective conceives of learners as active agents in their own development across differing eco-social environments, and characterizes knowledge development as highly individual and non-linear in association with complex dynamical systems theory (CDS) (Overton, 2014). The study also depended on sociocultural theory (SCT) because of its focus on learning and development through social interaction. Additionally, in accord with relational development, SCT and CDS, we analyzed movement in addition to speech, which has proven integral to cognitive development (Fischer & Zwann, 2008; Richardson & Chemero, 2014; Scorolli, 2014).

The primary purpose of the study was to extend the SCT research on second language development through the use of dynamical modelling and gesture analysis as situated in the data collection context of a one-on-one tutoring task. English language learners were paired with a native English-speaking tutor for consultation regarding a written class assignment in relation to English usage. Two research questions asked the following: 1) what synchronous movement patterns emerge during dyadic interaction between a non-native English speaking student and an English writing tutor? and 2) how do embodied aspects of interaction, as determined through analysis of movement, relate to second language development?

Dyads were video-recorded so as to capture upper body and head movements and hand gestures. To answer research question 1, a quantitative dynamical modelling technique, cross-recurrence quantification analysis (CQRA) (Marwan, *et al.*, 2007; Sun *et al.*, 2016), was used to model the amount of interactional synchrony interlocutors engaged in via the degree of bodily movement change. To answer research question 2, a qualitative analysis of co-speech gesture and gesture independent of speech was carried out to identify the role of gesture as related to second language learning. We further analyzed, from an SCT perspective, the relationship between gesture and intersubjectivity as associated with learning and development (McCafferty 2002; van Compernelle & Williams 2011; Smotrova 2014). The mixed design allowed a combined analysis of qualitative and quantitative data sources, and the use of real-time data revealed the microgenetic unfolding of learning/development as central to SCT.

Results for the study provide supporting evidence for an account of language development as relational and embodied. Patterns of interactional synchrony, as determined by bodily movement change, were identified among the dyads. Additionally, gesture and co-speech gesture were tied to key developmental events in language learning. Overall, the language development observed during the writing consultations was highly individualized. Each participant showed variability in learning patterns and engagement with mediated learning through movement, gesture, and their eco-social environment (Lantolf, 2000). By combining a traditional gesture analysis approach within the broader scope of movement, we have begun to discover how the relationship between gesture and development also relates to other movement characteristics taking place during an interactive learning task.



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Temporal gestures in Afrikaans

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Do Afrikaans speakers think and talk about time in the same frame? And what axis of reference do they use? In Afrikaans temporal language, time seems to flow along the sagittal axis, on which the future lies in front and the past behind us. In this study, we asked 32 Afrikaans speakers to deliberately gesture about future and past events. This was done by randomly assigning one of four pairs of questions to eight of the 32 participants, focusing on either deictic or sequential reference, about the past and the future (Casasanto & Jasmin, 2012). The results showed that most of the participants used the sagittal axis to anchor their gestures, consistent with Afrikaans front/back metaphors. The remainder of the gestures instead followed a lateral axis, which is not found in Afrikaans metaphors, thus confirming that gestural time references do not necessarily align with spoken language (Casasanto, 2016:169;183-184). Interestingly, however, a laterality effect was found in the choosing of the hands used to talk about the future and the past. All participants were right handed and therefore gave no comparison on how left-handed people would gesture about time, which is good, because it did not bias the data with handedness being a confounding factor (Casasanto & Lupyan, 2015:22-24). When looking at the hands used to gesture the future or the past, the following pattern emerged: On the sagittal axis, the left hand is used for the past 42.31%, while the right hand is used 81.48% for the future. The handedness on the sagittal axis has a chi-squared of 9.829 with 1 degrees of freedom and a statistical significance of $p=0.0017$. This can be interpreted as, even though the spatial metaphors are the determining factor for the choosing of the sagittal axis, the lateral axis, which is determined by conventional cultural artefacts, such as reading and writing direction, still has an influence on the gesturing about time (Casasanto & Jasmin, 2012:643). The participants knew they were investigated on deliberate gestures, but were not aware of their hand usage also being recorded, therefore leaving this open to spontaneity. Due to predominantly the left hand being used for the past and the right hand for the future, this could infer the implicit usage of the lateral axis when thinking about time. This is partially mentioned in Casasanto and Lupyan's paper, in which they suggest that handedness could influence how people perceive time (2015:24-25). One must remember however, that all participants were dominantly right handed, which could explain why the right hand overall still has a higher usage than the left hand. Other factors must be considered when making these assumptions. The order of the questions could have an influence on which hand is used for what temporal reference.

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Predicting human action: Shadowing linguistic and non-linguistic body movements

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A key component of language comprehension is the rapid prediction of incoming stimuli. Existing research suggests that in order to predict spoken language, nonlinguistic human actions, or gesture, individuals develop rapid motoric representations of observed actions (Pickering & Garrod, 2013). Further, these motor representations are grounded in representations of oneself, leading to egocentric biases in predictions (Knoblich & Flach, 2001; Pickering & Garrod, 2013; Nye & Fowler, 2003). While existing literature has drawn comparisons between spoken language and action (Pickering & Garrod, 2013), the present study is the first to examine predictive representations in the manual modality with American Sign Language (ASL) users.

We examined predictive processes in deaf ASL signers and sign-naïve spoken language users by adapting the 'shadowing' paradigm frequently used in spoken language research (Marslen-Wilson, 1985). In this adapted task, participants rapidly copy ("shadow") actions as they are shown on a screen. Participants shadowed themselves (tapping into their own motor representations), a friend (someone visually familiar), and an unknown model. Participants were filmed producing strings of one- and two-handed grooming gestures (e.g. scratch face) and pseudosigns (possible but non-existing ASL signs). In a second session, participants were filmed shadowing the model, their friend, and themselves. Silverback[®] software time locked screen recordings of stimuli with participant recordings (see Figure 1). These videos were loaded into Elan; lag times between the various stimuli and participants' productions constitute the dependent measure for the efficiency of predictions.

Preliminary evidence suggests that experience with a sign language does not influence overall prediction abilities, but it does interact with other factors. While signers were on par with nonsigners in gesture lag times, signers were faster than nonsigners for shadowing pseudosigns, indicating that sign phonology facilitates predictions for ASL users. Nonsigners showed an egocentric bias, with shorter lag times for themselves compared to an unknown model; this is consistent with previous research suggesting egocentric, motor-based prediction processes for human action. Signers, however, had approximately equivalent lag times for themselves and the model. Therefore, sign language experience does not appear to broadly impact the speed of prediction, but it may eliminate or reduce egocentric biases. Some studies have demonstrated that motoric representations are only active under the most phonologically complex (Watkins & Thompson, 2017), and the shadowing task may have been particularly difficult for nonsigners. All participants were faster for two-handed items, which may reflect a difficulty in suppressing non-dominant hand activity. Participants were also slower when shadowing a friend than the unknown model, which may be due to greater fluidity of the model's productions. In sum, this study demonstrates the same egocentric biases in gestures as nonlinguistic actions, while also highlighting the impact of sign language experience on such predictions.

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The gesture–prosody correlation and its variability: Spontaneous speech vs. actor's performance

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Gesture shows a linear structure that can be segmented into units aligned at some level with the ones of the verbal stream (Kendon 1972, 1980). The tight interrelation of gesture and speech is often remarked by the quote: “speech and movement appear together as manifestations of the same process of utterance” (Kendon 1980: 208).

On the other side, in speech, syntactic constituents are patterned into Information units, which follow the *flow of thought* and strictly correspond to Prosodic units (Chafe 1970). Information units are structured into higher level Reference units, which are terminated from a prosodic point of view and correlate with the performance of Speech acts (Cresti & Moneglia 2005). The objective of this study is to compare how the correlation between gestural units and prosodic units varies in acted speech with respect to spontaneous speech.

The dataset is made by two Italian collections of video-recorded sessions:

1. Three samples of spontaneous interviews to male actors, comparable from a thematic point of view;
2. Three performances of one monologue (taken from the Luigi Pirandello’s play ‘Il giuoco delle parti’) by the same actors (plus a fourth one).

The gesture annotation is based mainly on LASG (Bresse *et al.* 2013) and follows segmentation criteria from Kita *et al.* (1998). Gestures are analyzed at three hierarchic levels: Units, Phrases and Phases, comprising the identification of Strokes or Holds. Prosodic cues have been annotated according to the L-AcT framework (Cresti 2000; Moneglia & Raso 2014).

Prosodic units are those sequences of syllables ending with a prosodic boundary which bear a perceptively relevant prosodic movement (‘t Hart *et al.* 1990); Speech acts are identified through their correspondence with sequences of prosodic units ending with a Terminal prosodic break. Prosodic units have been also annotated with respect to their Information function.

Gesture and prosodic layers have been annotated independently the one from the other and then reconciled in ELAN files. The comparison shows strong differences between spontaneous and acted speech, specifically at the level of gesture / prosody synchronization. In both language varieties Strokes of Gesture Phrases match with Speech acts, are mostly placed inside prosodic units and never cross terminal prosodic boundaries. However, contrary to spontaneous speech, in acted speech the Gesture Phrases in which Strokes occur have less correlation with Speech acts and can span across terminal boundaries. Moreover, in acted speech, although Gesture Units are simple and tend to coincide with Gesture Phrases, they may not start and end in correlation with prosodic boundaries, while this is always the case in spontaneous speech. Finally, the co-speech gestures are non-continuous in acted speech and rest position, which never occur in our samples of spontaneous speech, frequently appear. The relation between Information functions and gesture will be also presented.

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Reduction of gesticulation and information patterning strategies in acted speech

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The paper reports on research focusing on the relationship between gesticulation (McNeill 2005) and speech, through the comparison between spontaneous speech (as natural language process) and acted speech (as planned language process). The study relies on the adoption of akin theoretical frameworks: L-AcT (Cresti 2000; Moneglia & Raso 2014) for speech and Kita *et al.* (1998) for movements. Our aim is to better define the linguistic correlation between speech and gesture structures and to highlight cognitive implications, emerging from eventually resulting gaps.

Following L-AcT the verbal stream results composed of two level unities, hierarchically related and prosodically recognizable: Information units (with regards of Chafe 1970), which segment the *flow of thought* in constituents, and Reference units (Cresti & Moneglia 2005), which structure constituents at a higher level. Information unit and Reference unit express two different aspects of communication: the informative one, given by the Information Structure, and the illocutionary force, given by the performance of the Speech Acts, as result of two different cognitive patterns: semantic program (Chafe) and language action program (Cresti). From a prosodic point of view Information units are distinguishable as a group of syllables perceptibly relevant ('t Hart *et al.* 1990), meanwhile Reference units have a perceptibly concluded intonation contour. Their related pattern rests on a compulsory root (the IU Comment) with optional adding units before and after it.

On the other hand, gesticulation shows a linear structure that can be segmented into units aligned at some level with those of the verbal stream (Kendon 1972, 1980) and that can be analysed at three hierarchic levels: Gesture Units, Gesture Phrases and Gesture Phases, which comprise the identification of Strokes or Holds. Similar to L-AcT configurational model, the gestural linear structure pattern is given by a compulsory root (the Expressive Phase made by at least one Stroke) and by other Gesture Phases eventually collocated before and after it.

The adopted methodology correlates gestural units and prosodic units on the basis of a dataset made by two Italian collections of video-recorded sessions:

1. Three samples of spontaneous interviews to male actors, comparable from a thematic point of view;
2. Three performances of one monologues (taken from the Luigi Pirandello's play 'Il giuoco delle parti') by the same actors (plus a fourth one).

The annotation of gestures is based on LASG (Bressem *et al.* 2013). Furthermore, prosodic unities have been annotated with respect to their Information function, as well as strokes to their semiotic dimension (metaphoric, iconic, etc) (McNeill 2005). Gesture and prosodic layers have been annotated independently the one from the other and then reconciled in ELAN files.

The comparison shows strong differences between spontaneous and acted speech and in the co-speech gesticulation:

1. At the level of gesture / prosody synchronization;
2. In the relation between Information functions and gestures.



As a whole, we have evidence of a reduction of the Information structure level in the acted speech, which is substituted by a segmentation into independent illocutionary activity. This strategy goes in parallel with gestural reduction. More specifically Gesture Units tend to coincide with Gesture Phrases and with the emerging of frequent rest positions. On the semantic ground, we noticed the drastic reduction of semantically autonomous metaphoric dimensions in the Expressive Phase.

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Less proficient, more gestures?

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The theory of compensatory gesture (Brown & Gullberg, 2008; Gullberg, 1998) suggests that gesture facilitates speech. The lower the language proficiency is, the higher the gesture rate will be. However, gesture is not the only approach to solve expression difficulties. If a speaker has difficulties finding a word in a foreign language, he can code-switch to his native language, use alternative words, or omit the information instead of using gestures. The current study asks whether people prioritize gesture for the purpose of compensation. In order to answer this question, this study performs two comparisons: 1) Compare the gesture rate of native Mandarin speakers when speaking Mandarin versus when speaking English; 2) When the Mandarin speakers are speaking English, compare the gesture rate of those with a high English proficiency versus those with a low English proficiency. According to the compensatory gesture theory, Mandarin speakers will gesture more frequently in English than in Mandarin. Additionally, Mandarin speakers with a low English proficiency will gesture more frequently than those with a high English proficiency.

Seven native Mandarin speakers were recruited from two universities in China, three of whom were of a high English proficiency, while four of whom were of a low English proficiency. The stimulus provided was a video cartoon clip. Each subject watched the video twice and retold the story to a listener as detailed as possible. The narrations were videotaped and transcribed with gesture notations.

The results show that first, the subjects gesticulate more frequently on average in non-native language than in native language. Specifically, those gestures co-occur with word repetition, word correction, and stressed words and syllables, indicating that speakers use gesture for self-repair and sentence segmenting, both of which function as compensations to the speakers' oral skill deficiencies in the non-native language. Second, contrary to the hypothesis, the high-proficiency group on average produces a higher mean gesture rate than the low-proficiency group, though not statistically significant. A qualitative analysis suggests that it is because the low-proficiency group uses alternative compensatory strategies such as skipping complex details in narration and code-switching to native language (see Example (1), both of which suppress the production of gestures.

- 1) Laura: OK. And second time, this cat use a *qiào qiào bǎn* ('seesaw') ... The stone fall down, and, *zá zhòng le tā* ('hit onto him').

This study acknowledges the compensatory function of gesture in speech. However, a low language proficiency does not always lead to a high gesture frequency because low-proficiency speakers may prefer other speech compensatory approaches. Using this study as a reference, language educators can encourage foreign language learners to adopt gesticulation when facilitating speech in order to improve their oral language skills.

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Bimodal musical pitch metaphors in Swedish and Turkish: When speech and gesture both converge and diverge

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How are language-specific metaphors for musical pitch manifested in speech and gesture? In some languages (e.g. Swedish), pitch may be described as ‘high’ or ‘low’ in speech, whereas other languages (e.g. Turkish) have expressions like ‘thick’ or ‘thin’ (e.g. Dolscheid, Shayan, Majid & Casasanto, 2013; Shayan, Ozturk & Sicoli, 2011). In both cases, the metaphorical expressions establish a cross-domain mapping of distinct spatial attributes to sound perception. Gesture studies have demonstrated that a number of metaphorical mappings also appear to be reflected in speakers’ gestures (see e.g. Cienki & Müller, 2008). However, the ‘height’ and ‘thickness’ metaphors for pitch have presently not been examined from a bimodal perspective on language production that relates simultaneous gesture production to metaphorical expressions occurring in speech.

To probe the bimodal conceptualisation of musical pitch metaphors crosslinguistically, we investigated how these metaphors are used simultaneously in speech and gesture by speakers of Swedish and Turkish. We hypothesised that: a) Swedish and Turkish participants would describe pitch using ‘height’ and ‘thickness’, respectively, in speech; b) representational co-speech gestures would co-vary with the axes invoked by spoken metaphors (i.e. vertical vs. lateral). In a production task 25 native Swedish and 25 Turkish speakers were asked to listen to stimuli consisting of pairs of sung notes differing only in pitch. Participants then described each pair to a confederate performing a stimulus-matching task. Descriptions were transcribed and co-occurring gestures were coded for use of space, i.e. movement pattern (e.g. up/down, increasing/decreasing distance of articulators) and location (high/low), and handshape (flat/curved).

Speech results show that Swedish participants frequently used ‘height’, but also ‘brightness’ metaphors to describe pitch, whereas Turkish participants mainly used ‘thickness’ metaphors. Gestures were both congruent and incongruent with the dimensions evoked by the spoken metaphors in both groups. The ‘height’ metaphor was frequently accompanied by congruent gestures indicating physical height. However, the ‘thickness’ metaphor was not accompanied by lateral gestures indicating thickness of pitch, but rather by (congruent) gestures varying in tightness of grip. Moreover, Swedish participants using ‘brightness’, and Turkish participants using ‘thickness’ metaphors often produced vertical gestures that were incongruent with the actual metaphors used, instead evoking the ‘height’ metaphor. Co-speech gestures thus aligned with the dimensions indicated by the spoken metaphors part of, but not all of the time. We discuss the implications of the observed patterns for the current views of metaphorical mappings across perceptual domains.

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How does restraining and encouraging the use of gestures affect speech? A prosodic analysis

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Research on the relationship between speech and co-speech gestures has shown that the two modalities form a single integrated system [1] [2] and has proposed different models explaining their interaction [3] [4] [5] [6]. Additionally, both behavioral and neuroimaging studies have proposed that language and gestures share the same motor control system [7] [8]. Moreover, there is a general agreement on the gestures' self-oriented cognitive functions [9] and their beneficial role in learning, thinking and speaking [4] [10] [11] [12] [13] [14] [15] [16]. Thus, intuitively enough, either restraining or encouraging the use of gestures should have an impact on speech production. While previous studies have focused on the effects that restraining the use of gestures has on speech fluency, the question of how encouraging gestures affects fluency has received little attention.

The inability to gesture seems to impact speech production in different ways. An early study by Dobrogaev [17], that remains almost anecdotal, found that speech becomes less fluent and more monotonous. More recent studies found speech to be less fluent [18] [19] [20] especially in expressing spatial content [6] that becomes less detailed and less semantically rich [21]. Rimé *et al.* [22] did not find speech to be less fluent but reported a decrease in general imagery content. And Hoetjes *et al.* [23] could not confirm any clear effects either on speech fluency or on speech monotony.

As for encouraging gestures, to our knowledge, previous studies have not directly addressed the question of whether asking participants to gesture while speaking has an impact on their speech fluency. Nevertheless, previous findings suggest that the use of gestures has a positive effect on lexical retrieval [24], enhances the voice spectrum of the semantically related word [25] and the acoustic realization of prosodic prominence [26].

The present study investigated the effects of restraining (Exp.1) and encouraging (Exp. 2) the use of gesture on speech fluency. In each pilot experiment, 10 participants took part in a narration task where they were asked to describe 14 comic strips to a research assistant. Two conditions were tested: No instructions and Restraining gestures (Exp.1); No instructions and Encouraging gestures (Exp.2). The following speech correlates were measured: speech discourse length (number of words, discourse length in seconds), disfluencies (filled pauses, self-corrections, repetitions, insertions, interruptions, and silent pauses), speech rate, as well as measures of intensity and pitch. The results show that restraining gestures leads to quieter and slower paced speech, while encouraging gestures triggers longer speech discourse, higher speech rate and a more fluent and louder speech.

These results are in line with previous studies on hand movements restriction (Exp.1), and show that encouraging gestures affects speech prosody, too (Exp.2). They can be interpreted in the framework of one of the most recently proposed models [9] and they suggest new interactions between gestures and prosody that need to be further investigated.

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Surprise: Syntax, gesture and prosody go hand in hand

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In this work, we investigate the expression of surprise in Italian through an experimental study. We consider counter-expectational surprise questions – rhetorical questions not requiring a real answer – and compare them with sentences overtly expressing surprise. We found a characteristic gestural pattern, which is combined with specific prosodic features and typical syntactic structures. We conclude that in order to express surprise the three components – syntax, prosody and gesture – must work together, to ensure a felicitous communication process.

Given a scenario where I know that Gianni is on a diet and only eats fruit, when I see him eating a hamburger I am surprised and say:

- 1) *Ma non mangiavi solo frutta?*
'But weren't you eating only fruit?'

This rhetorical question is compared with (2) overtly expressing surprise:

- 2) *Mi sorprende che tu stia mangiando un hamburger*
'I'm surprised you are eating a hamburger'

This study tests the production of counter-expectational questions with 15 Italian native speakers who were introduced to specific contexts and asked to produce the questions previously presented in a written form. To check individual variation, participants had different ages (16-64) and social levels. We introduced four different conditions to check the gesture patterns:

- A: both hands free;
- B: simulation of a phone communication, only one hand free and no visible interlocutor;
- C: holding a bag, both hands “trapped”;
- D: surprise overtly expressed.

Participants were videotaped, and their production analyzed with Praat and ELAN.

In condition A, 40 out of 54 utterances were produced with the same gesture, Palm-Up Open Hands (PUOH). Analyses of both prosody and gesture showed that the stroke of PUOH coincides with the highest pitch of the sentence. Moreover, the gesture was also correlated with either furrowed (15/54) or raised (17/54) eyebrows, and with head negation (16/54) or head nod (17/54).

In condition B, the gesture PUOH was realized with one hand in 11/18 sentences.

In condition C, in 24/54 sentences participants moved hands and arms, willing to realize the PUOH. The other non-manual components occurred much more than in the other conditions: the expression of surprise is taken over non-manually, given that gestures are not fully available.



Condition D showed that whenever surprise is expressively declared, the duration of the gesture PUOH (produced in 44/90 cases) corresponds only to the part of the sentence expressing surprise.

We show that surprise is expressed by means of complex patterns of gestures, prosody and syntax. Crucially, this holds also for situations other than face-to-face communication, showing that co-speech gestures are crucial in enabling the expression of feelings integrating and complementing syntax and prosody.



The effect of typical and atypical iconic gestures on adult narrative comprehension

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When we use gestures with speech, the gesture itself facilitates comprehension of a spoken message by providing a visual representation. As a result, watching gestures can aid learning. This study explored whether watching different kinds of iconic hand gestures (i.e., concrete gestures that are semantically related to the content of speech, typically reflecting an object, action, or event) differentially affect narrative comprehension in adults. While watching iconic hand gestures has previously been shown to benefit narrative comprehension, it is yet to be investigated whether different kinds of iconic hand gestures are more beneficial than others. Furthermore, it is unclear whether gestures are more beneficial when a task is more complex. In this study 120 undergraduate university students were randomly allocated to one of three conditions, with each condition requiring the participant to watch a videotaped narrative. In one condition, at various parts of the video narrative the narrator produced iconic gestures that are produced naturally in the absence of explicit instruction (i.e., typical gestures). In the second condition, the narrator performed iconic gestures that could be produced spontaneously, but typically are not produced in the absence of explicit instruction (i.e., atypical gestures). In the third condition, the narrator produced no gestures. While watching the video narrative, participants were either instructed to engage in a low working memory load secondary task, or a high working memory load secondary task. In the low load task, participants vocalised “rah” once per second throughout the entire video. In the high load task, participants vocalised “dog, fish, bird” repeatedly throughout the video, at a rate of one word per second. After watching the video narrative associated with their condition, participants were asked a free recall question and 15 specific questions about events depicted in the narrative. Finally, participants completed an abbreviated test of working memory that measures listening sentence span. Verbal recall of the narrative was compared between groups for free recall and specific questions. While there was no effect of gesture condition or working memory load on free recall, results suggested that participants benefitted from watching typical gestures relative to the no gesture group on recall of specific questions. In contrast, watching atypical gestures was neither beneficial nor detrimental to narrative comprehension. Working memory load had no effect on recall of specific questions. These findings enhance our understanding of the differential effect of observing different types of iconic gestures on narrative comprehension, through suggesting that iconic gestures are not a homogenous set. Whether observing iconic gestures benefits learning seems dependent on the kind of iconic gesture observed, rather than task complexity.



Gestural introduction of referents in connected discourse

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For discourse to be comprehensible, speakers must at all times make clear who/what is being talked about (entities/referents), and when, where and how these entities are (acting) or are acted upon. A considerable literature examines how referents are tracked in spoken discourse, for example how they are introduced, maintained, and re-introduced (e.g. Ariel, 1988; Chafe, 1994; Givón, 1983; Lambrecht, 1994). In contrast, we still know comparatively little about when and how referents are introduced with gestures. Previous studies suggest that discursive and grammatical properties in speech, such as information status (new/given), syntax (one/two clause or transitive/intransitive constructions), definiteness (indefinite/definite NPs), and grammatical role (subject/object) affect the number of gestures and gestural mode of representation (e.g. Debreslioska & Gullberg, 2017; Debreslioska, Özyürek, Gullberg & Perniss, 2013; Gullberg, 1998, 2003, 2006; Kita & Özyürek, 2003; Levy & McNeill, 1992; Marslen-Wilson, Levy & Komisarjevsky Tyler, 1982; Parrill, 2010, 2012; Perniss & Özyürek, 2014; Wilkin & Holler, 2010). In this study, we focus on how referents are introduced in speech and whether gestures are sensitive to local and/or global markings of newness.

We collected German narratives ($n= 20$) and examined the relationship between nominal definiteness (definite/indefinite lexical NPs), grammatical role (subject/direct object/oblique object), clause structure ('presentatives'/SVO/other), and presence (yes/no) and viewpoint (observer/character) of gesture.

Preliminary results suggest that (a) speakers produce gestures with approximately 50% of the referents introduced in speech; (b) speakers produce gestures more frequently with direct objects than with subjects or oblique objects; (c) speakers are more likely to produce OVPT gestures with definite NPs and CVPT gestures with indefinite NPs; (d) speakers typically introduce referents as direct objects in SVO constructions with CVPT gestures, and (e) referents as subjects in 'presentative' constructions with OVPT gestures. The results support previous research showing that gestures are linked to grammatical and discursive properties of speech, varying in number and mode of representation with different clause structures, grammatical roles, and nominal definiteness. Specifically, OVPT gestures seem to be linked to inferable referents, and new subject referents in 'presentative' structures, whereas CVPT gestures seem to be linked to new object referents in SVO structures.

The findings provide new insights into the speech-gesture relationship in the production of connected discourse. They suggest that gestures function as means to introduce new information but that speakers do not always recruit them. We discuss reasons for this tendency. Furthermore, the findings show that gestures co-vary with speech in order to create different information ordering structures. Thus, they highlight the importance of the discourse and grammatical context in which gestures appear for our understanding of their form.

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Measuring iconicity in sign language: Effects of linguistic knowledge and transparency on perceived iconicity

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In contrast to spoken languages, many lexical forms in sign languages are iconically motivated: there is a resemblance between form and meaning. Iconic motivation in spoken language is found in limited phenomena like onomatopoeia, but the visual modality abounds with opportunities to create manual forms that resemble their meaning. We investigated how the perception of resemblance between form and meaning is impacted by linguistic knowledge of the sign language lexicon and how the perception of iconicity changes when the sign meaning is known versus when it must be guessed. Thirty-two deaf American Sign Language (ASL) signers and 21- 37 hearing non-signers rated the iconicity of 992 signs from the ASL-LEX database [1] (<http://asl-lex.org>) using a 1-7 scale (7 = very iconic). Non-signers were given the English translation of the ASL signs. In a second study, 20 hearing non-signers guessed the meaning of a subset of these signs (N = 430) and rated how obvious (transparent) this meaning would be for others, using a 1-7 scale (7 = very obvious).

Iconicity ratings for deaf signers and hearing non-signers were correlated ($R^2 = 0.67, p < .001$), but signers tended to rate signs as less iconic ($t(730) = 4.9, p < .001$). This result indicates a) folk knowledge of iconic motivation does not increase perceived iconicity and b) sign features may be perceived as phonological rather than as carrying meaning, thus reducing overall iconicity ratings. For non-signers, gesture experience impacted iconicity ratings for handling (hand-as-hand) and instrument (hand-as-object) signs. Non-signers rated handling signs as more iconic than instrument signs, but signers rated them as equally iconic. Handling gestures are more often used to represent objects [2], which may have increased non-signers' iconicity ratings. Signers provided higher iconicity ratings than non-signers for signs in which the handshape represented whole/part entity (e.g., BALL, BIRD), reflecting their knowledge of the ASL classifier system.

Signs perceived as more guessable (transparent) were rated as more iconic by non-signers ($R^2 = 0.57, p < .001$). However, only 3% of signs (14/430) were correctly guessed by at least 70% of the non-signers, replicating early studies [3]. Several highly transparent signs resembled conventional gestures (e.g., DRINK, FOUR, SMOKING). Some signs that were rated as highly iconic when the meaning was provided were never (or rarely) guessed correctly when the meaning was not provided to the non-signers (e.g., LIPSTICK); rather, the guesses reflected participants' focus on a different iconic mapping (e.g., "quiet"). Further, some signs with low iconicity ratings (e.g. WHERE) had high transparency ratings because non-signers were confident of their incorrect guesses (WHERE resembles a "no" gesture). Overall, these data emphasize the important distinction between transparency and iconicity and reveal how linguistic knowledge and gestural experience impact iconicity judgments.

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How gesture facilitates diagram construction in calculus

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Instructors often use gesture to highlight important information when setting up and solving mathematics problems, yet there is limited research on how calculus students use gesture when solving problems. Sinclair and Tabaghi (2010) called for research into how learners' gestures facilitate the construction of diagrams and mathematical thinking. We add to our understanding by answering the questions: How do students use gesture when solving contextual calculus problems? How do students' diagrams evolve in relation to the gestures that they make?

An instructor will prepare a diagram in advance, while students have to create one from the problem text. In this study, we observed how one calculus instructor taught the concepts of related rates and optimization and how a pair of his students solved similar problems. Attention was given to how gesture was used by the instructor and students when engaging in the orienting and planning phases (Carlson & Bloom, 2005). It is during these phases that the problem solver is interpreting the problem and modeling the phenomenon, often creating diagrams. A qualitative case study methodology was used to examine how the students used gesture to facilitate diagram construction and make links between key ideas (Alibali *et al.*, 2014).

A pair of student volunteers solved three problems in a think aloud protocol. These problems were similar to problems that had been presented by their instructor during regular instruction. There was at least one problem in each session that required the students to construct a non-standard geometric shape that had not been seen in class; for example, an L-shaped deck. Each of these problem-solving sessions was video recorded and transcribed for analysis.

The students' gesture production increased when students were solving problems that involved non-standard geometric shapes, as did the number of interactions with and revisions to their diagrams. The gestures were often writing gestures manifested in the several revisions of their diagrams. Figure 1 shows the complex, messy diagrams and equations that resulted from the students working through the orienting and planning phases of the deck problem. Notice that there are elongated circles around the right, inside edges of the L-shape. These circles were writing gestures made as the students noted that they did not need to have railing along the house. We observed several such instances as the students engaged their bodies to figure out the relevant information for their diagrams. From these findings, we conclude that gesture production during the problem-solving process is helpful in the orienting and planning phases of the problem-solving process and can help students make connections and extensions to ideas that were presented in class.

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Structural cues for symmetry, asymmetry and non-symmetry in Central Taurus Sign Language

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Central Taurus Sign Language (CTSL) is a village sign language used in three isolated villages in south-central Turkey. CTSL emerged in the absence of a linguistic model within the last half-century as a result of recessive deafness in these communities, which have deaf populations of 4.8%, .6% and .5%.

Previous research has shown that symmetrical and reciprocal predicates have specific and distinct syntactic properties in spoken languages (Gleitman, *et al.*, 1996) and in Nicaraguan Sign Language (Flaherty, *et al.*, 2013, 2014). Building upon Flaherty *et al.* (2013, 2014), the present study investigated (i) whether CTSL has any distinctive structural cues marking symmetrical actions and reciprocal actions; (ii) if it has, how these structural markers evolve over time across age cohorts of CTSL signers.

We developed a controlled elicitation task in which deaf signers viewed 62 short clips involving two characters performing actions that were symmetrical (e.g., shaking hands), reciprocal (e.g., punching each other), transitive (e.g., one punching the other), and intransitive (e.g., both punching towards the camera). Twelve signers, grouped into three successive age cohorts, participated ($M_{age}=42.2$, age range: 17-55). We detected several devices that were candidate structural cues, and compared them across cohorts as a measure of how CTSL has evolved over its 50-year existence. Our findings are as follows ($n_{total}=946$):

- 1) *Temporal sequencing*: CTSL signers distribute information temporally across an utterance by sequentially signing each action performed by each character in the contexts involving intransitive, transitive and reciprocal actions, but not symmetrical actions. Temporal sequencing becomes more systematic in successive cohorts.
- 2) *Body segmentation*: Symmetrical and reciprocal actions come to be frequently marked by body segmentation –one side of the body is allocated for one of the characters and the other side is allocated for the other character– and it becomes more conventionalized over cohorts to express reciprocity.
- 3) *Mirroring*: Signing with both hands in a mirror-image configuration was often used for reciprocal and symmetrical actions, but not for intransitive and transitive actions.
- 4) *Perspective*: Flaherty *et al.* (2013) found evidence for double perspective verb pairs in NSL –events being expressed both from the agent’s and the patient’s perspective. Here we find that CTSL prefers a single perspective in reversible transitive events, but a double perspective in reciprocal and symmetrical events, with an increasing tendency for systematicity in reciprocal events.

Briefly, our results indicate that each action has its own combination of essential components to encode symmetry, asymmetry, and non-symmetry. Our findings provide further evidence for how a brand-new language develops from idiosyncratic gestures of individual signers and turns into a system with distinctive shared devices that differentiate between verb classes in an increasingly systematic way over generations of learners.

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Iconicity and gesture reduction: A study on marking in dance

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Dancers of classical ballet and of neo-classical companies typically rehearse their choreographies by running through the dance steps in a reduced form, which is physically less straining than performing them “full out”: this wide-spread practice is known as “marking”. Notably, marking has gained more interest from scholars in the field of cognitive science than from dance research, with some scientists (Kirsh 2010, Warburton *et al.* 2013) positing that there may be cognitive benefits besides the physical ones when dancers mark their steps in rehearsals.

Unlike other related research which considers marking as “convention-driven and quotable” in terms of Kendon’s Continuum (Kirsh, 2010, p.2866), we argue that the gestures produced during marking are not emblems, but are motivated iconically in their production by schematically representing the images created by the body in motion (image-driven, rather than convention-driven).

In this paper, we compare formal movement aspects in the dance steps, between marking sessions and the corresponding full-out session, in order to identify which aspects are reduced when dancers are gesturing to recall their choreographies. Using an ethnographic approach, we accompanied and video-recorded the daily rehearsals of the National Ballet Company of Portugal for the première production of a neo-classical dance piece, focusing on two of its dancers, for a period of 4 months.

Dancers’ steps of the target “full out” performance were segmented and matched with their corresponding markings, produced naturally (without elicitation) soon before. Expert raters coded the dance steps as novel or more or less conventional. Various formal movement parameters of the steps (e.g. trajectory, scale, effort, spatial and temporal properties) were compared between the marking and the full-out conditions and scored as more or less present in the marking.

The aims of this study are above all to identify which movement parameters are perceived as essential or not when dancers mark their sequences, and what motivates the inclusion and exclusion of these parameters in their marking (e.g. affordance, conventionality, imagistic properties). One hypothesis that is tested is if the more formally conventional the dance move is (e.g. *arabesque*, *développé*), the more reduced it will be in the marking, as opposed to more novel dance steps, which would require more information encoded in their gestural forms.

Our data confirm that marking is used by all dancers of choreographed performances in some form, but suggest that it is acquired in context, much like a gestural system of a linguistic community which is not taught, but rather acquired. Moreover, the imagistic qualities of dance motivate the spatial and iconic representations in marking, closely related to those found in co-speech gestures. As such, our analysis of iconicity in marking practices intends to inform iconicity and reduction in gesture research.

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Does gesture help learners create procedural knowledge and resist interference?

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Hand gesture during instruction improves learning of mathematical and scientific concepts, including effects at the classroom-wide level (Cook, Duffy & Fenn, 2013). Although the benefit of gesture in learning is well-established, the precise mechanism underlying this effect remains unresolved. One possibility is that gesture might increase procedural representations. Patients with hippocampal amnesia who are unable to form new declarative memories but who have functioning procedural memory are influenced by gestures that they observe while patients with Parkinson's disease, who have impaired procedural memory with functioning declarative memory, do not show typical effects of gesture on learning (Klooster *et al.*, 2015). This pattern suggests that gesture can create procedural knowledge.

If gesture helps to create procedural knowledge, learners should be more resistant to interference after learning with gesture compared to learning without gesture. We tested this prediction in a clinical trial implemented at the classroom level. Children view videotaped instruction in mathematical equivalence. For half of the classrooms, the instruction includes pointing and representational gestures and, for the other half, the instructor does not use gesture. Importantly, the videos are meticulously matched for intonation, amplitude, eye gaze, and body position. After instruction, half of the students in each classroom solve problems that activate an incorrect interpretation of the equal sign and the associated procedural knowledge of arithmetic (e.g. $4+3+8=$ __). The other half solve the exact same problems, oriented vertically. The vertical problems require the same mathematical operations, but, because they do not include the equal sign, and are structured differently, they should not impose interference. Finally, children complete an immediate posttest and transfer test and, on the following day, children complete a second posttest and a test of conceptual knowledge of the equal sign.

Because of variability across schools and classrooms, we estimated that we would need 16 classrooms in each gesture condition ($n = 32$) to assess the effect of interference on learning with gesture. To date, we have completed data collection in 15 classrooms with a sample of 312 students. Data collection will be completed by May 2018, with an anticipated sample size of over 600 children. We predict that children who learn with gesture will be more resistant to interference. Thus, we expect the gesture group will show less impairment from interference than the group instructed without gesture. We will also be able to examine effects of gesture on transfer and conceptual knowledge and the effects of gesture on memory consolidation.

Our design, predictions and analyses are registered on the Open Science Framework. This will be the largest clinical trial of the effect of gesture on mathematical learning at the classroom level and has the potential to add important insight into the mechanism underlying the well-documented benefit of gesture in mathematical learning.



Gesture and speech prosody in aphasia

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Communicative diversity is present in any speech community, where some speakers are deemed more competent than others in a normative view of language. In this respect, people with aphasia (PWA) often experience communication failure and frustration in their everyday life. One of the questions often addressed in the literature to help PWA overcome speech difficulties is whether they could use gesture as compensation when words are lacking (de Ruiter, 2006; Rose *et al.*, 2017; Scharp *et al.*, 2007; van Nispen, 2016, among others). Yet, we still know very little on the prosodic structure of PWA's gestures and how they relate to their speech. We propose to address this particular issue with the help of video recordings from the AphasiaBank (MacWhinney *et al.*, 2011) featuring 4 non-fluent PWA (2 Broca and 2 TCM) as well as 2 non-aphasic controls telling narratives of personal experience. Speech was transcribed verbatim using Praat (Boersma and Weenink, 2009) and gesture types and phases were coded with Elan (Sloetjes and Wittenburg, 2008).

Our results show that PWA gesture as much as controls but since their speech rate is slower, their gesture to word ratio is higher. The type of gesture used by PWA is in relation with their agrammatic and dysprosodic speech: they produce less pragmatic gestures linked to discourse organization but also use less flat contours in intonation showing discourse continuation. Instead, they use more falling intonation contours showing that their speech chunks (mostly noun phrases) are separate utterances not linked with one another. Whereas their speech is punctuated with frequent silent pauses between words, it is also punctuated with beats in gesture.

Neither their referential nor non-referential gestures are longer than controls' but they include more preparations and pre-stroke holds. As compensation, they include less post-stroke holds and retraction phases. This strategy emphasizes gesture beginnings thus giving time to PWA to align gestures with words as they experience particular difficulties with word initiation (Kurowski and Blumstein, 2016). Mayberry & Jaques (2000) found similar results for stuttering people. Another interesting parallel can be drawn between PWA's speech and gestures: PWA often utter the first consonant of a word which is then truncated before they start anew and in the same way, they also produce aborted gestures with a preparation and a retraction phase but no apparent stroke.

Lastly, PWA gesture more than controls during pauses in speech (which supports the gesture compensation theory) but also uses more beats and emblems than controls and these gestures are strictly aligned with speech (which supports the word retrieval facilitation theory). We therefore agree with Kroenke *et al.* (2013) that gestures have the two functions for PWA.

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Pantomime and perspective-taking in children with Autism Spectrum Disorder

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Impairments of motor representation of actions have been reported as a core component of Autism Spectrum Disorder (ASD) (e.g., Cossu *et al.* 2012; Williams *et al.* 2004), a neurodevelopmental disorder characterized by deficits in social communication and interaction, along with restricted and repetitive interests and behaviors (Apa, 2013). Such an impairment affects several aspects of the motor domain: although the debate is lively (e.g., Sevlever and Gillis 2010), individuals with ASD have been shown to have severe difficulty in assuming anticipatory postures (Kanner 1943), imitating body movements (Rogers and Pennington 1991), producing and comprehending gestures (Knaus *et al.* 2017; Mastrogiuseppe *et al.* 2015) as well as recognizing motor intentions (Boria *et al.* 2009). The processing of pantomime includes nearly all of these motor aspects (which in pantomime work together rather than individually). On this basis, pantomime might be of particular importance for a broader understanding of motor deficits in ASD. The sophisticated nature of pantomime is clear when considering its core features. Indeed, a recent proposal argues that to clearly differentiate it from other motor-visual communicative behaviours such as “gestures” it needs to be defined in a “rich way” as a non-verbal communication system involving the whole-body re-enactment of events displaced from the here and now (Żywicznyński *et al.* 2016). In light of this definition, pantomime is strictly connected with the ability to represent events. The property of representing events makes the generation and comprehension of pantomimes more complex than the production and recognition of single gestures that do not have an action-oriented character and do convey discrete concepts rather than holistically structured scenarios (Sandler 2009).

In line with these premises, we present a study with ASD children aged between 8 and 12 tailored at investigating their ability to understand pantomimic events. The materials of the current study have been adapted from Zlatev *et al.* (2017). Pantomimic events were administered in two conditions: first-person perspective (FPP; one actor pantomiming only the agent of the event); two-person perspective (TPP; one actor pantomiming both agent and patient). This study has two aims. The first general aim is to evaluate whether the well-known motor representation difficulty of individuals with ASD also concerns their understanding of pantomimic actions. We expect that this will be the case. Moreover, we aim at exploring a more specific issue: the role of perspective-taking in the comprehension of pantomime. A consistent line of research frames such an ability within an embodied perspective that underlines the role of the sensory-motor system in perspective-taking (e.g., Jackson *et al.* 2006; Muto *et al.* 2017). In this regard, we aim to investigate whether the two conditions (FPP vs TPP) - which involve two different kinds of perspective taking – would have an effect on the performance of the children. In accordance with the embodied literature, we hypothesize that this will be the case. In particular, we expect that the TPP, requiring more sophisticated abilities



of perspective shifting than the FPP, will be more difficult to understand. This is ongoing research, the results of which will be presented at the conference.

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Quantifying emergent structure in Nicaraguan Sign Language using motion tracking technology

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With the founding of a new school in Managua approximately forty years ago, Deaf Nicaraguans came together in greater numbers than before. Though teaching was in Spanish, Deaf students soon began to communicate manually. This was the beginning of a new language: Nicaraguan Sign Language (NSL). Each year children enter the school and learn the language from their older peers, eventually becoming Deaf adults who use NSL for daily communication. Over successive generations, the language grows and changes. By comparing signers of different generations, we can document these changes. Here we present a first attempt to investigate this structural change with motion tracking technology. Using the Kinect Motion Sensor, we quantify a change that has often been hypothesized to occur in the development of a new sign language: reduction in size of the signing space.

Decrease in the size of a language's signing space, the area in front of the body in which signers produce signs, has been cited as evidence of maturation of a language and development away from its gestural roots (e.g., Nyst 2007). This phenomenon has previously been mentioned in NSL (Kegl, Senghas, & Coppola, 1999), but in the nearly twenty years since that first mention it has not been rigorously quantified.

Seventeen Deaf Nicaraguan Signers participated in our study, all of whom began signing in childhood. Participants were drawn from a wide age range, having entered the Deaf Community from soon after the founding of the school (1974) to nearly thirty years later (2003). We tracked the position of signers' wrists using the Kinect, which returns inferred XYZ positions of 21 joints at a target frame rate of 30 fps (Schotton et. al., 2013). Before analysis, skeleton data for each participant was filtered using median filtering to reduce noise, and skeletons were scaled to have the same upper-arm length to minimize effect of differing body proportions.

We measured signing space using the euclidean distance between the tracked position between the shoulders and the tracked position of each wrist. This distance was computed at each frame and averaged over the session to obtain the mean distance of the wrists to the base of the shoulders for each signer (Figure 1). A simple linear model predicting size of signing space as a function of year of entry finds a significant effect ($F(1,15)=6.15, p=.025$).

We find that younger signers employ a smaller signing space than older signers, reflecting a change in the language itself: signing space in NSL is decreasing in size as it is passed down to subsequent generations. Using motion tracking data, we have documented that as signers learn, use, and transmit NSL, the language begins to more closely resemble older sign languages around the world.

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Interplay of choreographic decision-making and bodily communication between choreographer and dancer

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Artistic practices set up a relevant opportunity to understand how humans use their bodies to communicate intentions and emotions, since they are aimed at generating novelty (Karpati *et al.* 2015). Very few studies focus on the creative process in dance composition, mostly approaching this phenomenon from the perspective of social sciences (Stevens & McKechnie 2005; Stevens *et al.* 2003). Alternatively, we have approached dance composition from the perspective of neuroscience (Lisman 2015). Here, the choreographer is a decision-maker who weighs information (Kable & Glimcher 2009) about the movements being generated by the dancers, choosing whether each dancer should repeat a given movement for further improvement or not. We aim at uncovering the underlying structure of the creative process that choreographer and dancer go through, therefore gaining a better grasp about the intentions and emotions that are being communicated.

We video recorded the entire process of rehearsals of a neo-classical ballet dance piece by Rui Lopes Graça & João Penalva (Portugal). Through video hand-scoring, we have isolated the movements of one dancer by chronological order. Subsequently, we have interviewed the choreographer focusing on aspects of their creative process and underlying motivations driving his decisions.

Throughout the creative process, we have observed that the dancer has oscillated between repetitions of a single movement or generating a different movement. In blocks of consecutive repetitions, the dancer generated between one and three repetitions in most of the blocks (55%). This is an indication that both the dancer and choreographer were highly efficient in using bodily communication. Nevertheless, there was a small percentage of blocks where the dancer generated at least twenty repetitions (7%). This seems to indicate that the choreographer was searching for specific patterns. Additionally, the dancer generated less and less repetitions across sessions (-6% each session). This proves that the communication between the dancer and the choreographer becomes more efficient with time. Moreover, the choreographer has self-reported during the interviews that he was mentally visualizing a pattern, which he wanted the dancer to correspond to, and that he felt more satisfied when that happened.

We have gathered preliminary evidence that the choreographer's goal was to instruct the dancer through bodily communication, in order to match a specific pattern of movements represented in his own body and mind. From the perspective of neuroscience, we speculate that this representation works as a "template" (Aglioti *et al.* 2008; Cross *et al.* 2011; Song 2017). From the perspective of gesture studies, we speculate that this representation conveys intentions and emotions. Our work shows that not only is it valid and useful to use quali-quantitative approaches to better understand bodily communication in creative settings, but also it contributes to bridge the gap between gesture studies and neuroscience.

Do bilingual and monolingual children use iconic gestures in speech disambiguation?

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Everyday language is rife with verbal ambiguity. Adult speakers (Holler & Beattie, 2003) and listeners (Holle & Gunter, 2007) use iconic gestures to resolve lexical ambiguities, and to disambiguate the dominant and subordinate senses of homonyms. The only study that has investigated the developmental role gesture plays in the resolution of lexical ambiguity has focused on how children produce gestures to disambiguate homonym senses. Kidd and Holler (2009) found that while 3-year-olds rarely disambiguated between different senses, 4-year-olds used gestures to do so. Five-year-olds rarely used gestures since they were able to verbally resolve lexical ambiguities. Thus, gestures provided children who were just starting to understand homonymy with a valuable tool to communicate this understanding. Currently, however, very little is known about the role of gestures in children's comprehension of homonymy.

In two studies, we asked whether a speaker's iconic gestures help children resolve lexical ambiguity in speech. Monolingual (English) and bilingual (English-French) children aged 4 watched videoclips where a speaker uttered a sentence containing a homonym (e.g. *The glasses fell on the floor and broke*) that was accompanied either by an iconic gesture, or no gesture. Children were then given pictures that depicted the dominant and subordinate senses of the homonym and asked to choose which sense the speaker referred to. Both bilingual and monolingual children often had a preference for one of the senses of the homonyms, regardless whether this dominant sense was accompanied by a gesture. In contrast, the presence of iconic gestures significantly increased children's preference for the subordinate senses of homonyms. There were no differences in how gesture changed preference for the different senses across monolingual and bilingual children. Finally, those monolingual children who performed better on the homonym task had smaller vocabularies as measured by the PPVT.

In sum, children benefit from speakers' gestures selectively, only using them to comprehend senses that they would otherwise ignore. Moreover, gesture's beneficial effect is general in nature and extends across the different languages that children speak. Seeing different homonym senses represented in gesture might help young children better understand that one-to-many mappings are possible in language, and allow them to zoom in on senses that they have not yet fully acquired.

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Hands-on emotion: Gesturing while speaking produces an adaptive physiological response

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Despite early scientific attempts to link language and emotion (Darwin, 1872), the study of language over the latter 20th century has greatly minimized the role of emotions (Barrett & Lindquist, 2008). However, recent work suggests a much closer relationship between the two domains than traditionally believed (Fitch, 2017). Following from this, it makes sense to explore the affective role of hand gestures—which McNeill (1992) argues are fundamentally *part of* language—during speech production. Based on research showing that unrestricted emotional expression during communication produces adaptive physiological arousal (i.e., the challenge response, Peters & Jamieson, 2016), the present study investigates whether gesturing while speaking serves a similar physiological function.

To induce emotional states, fifty-seven participants watched either a neutral or sad video and then described two photos of Victorian dresses to a partner via video camera (Bavelas *et al.*, 2002). Gesture was allowed in one description but prohibited in the other. To quantify emotion, we measured two physiological states, total peripheral response (TPR) and heart rate (HR), which combine to reflect physiological threat (non-optimal) or challenge (optimal) responses (Peters & Jamieson, 2016). Seery (2011) states that “challenge occurs when evaluated resources meet or exceed demands, whereas threat occurs when demands exceed resources.” In addition, we measured subjective emotional states via questionnaires. To quantify gesture production, we recorded gesture rate per word.

Affective DVs: The mood induction was successful, with participants scoring higher on a measure for sadness in the sad vs. neutral video condition, $F(1,54)=71.83$, $p<.001$, $\eta^2=.571$, but there were no differences in challenge/threat responses across mood conditions, nor was there an interaction of mood by gesture. However, we found that for people who gestured, TPR was lower, $F(1,40)=7.91$, $p=.008$, $\eta^2=.16$, and HR was higher, $F(1,40)=6.32$, $p=.015$, $\eta^2=.13$, than people who did not gesture. This pattern reflects a classic challenge response for those who gestured.

Gesture DV: There were no significant differences in gesture rates across mood conditions, nor were there any correlations among physiological measures, questionnaire responses and gesture rates.

Although our mood induction was successful, it did not affect physiological measures or gesture rates. However, subjects in the gesture condition showed a classic challenge response regardless of mood, suggesting that gesturing produces a better physiological state than not gesturing. Interestingly, the amount of gesturing did not matter for the challenge response, so just being allowed to gesture may cause people to evaluate their affective resources as exceeding demands, whereas prohibiting gesture may cause people to evaluate demands as exceeding resources. This suggests that gesture may not be linked to specific emotions, but being allowed to produce gestures may serve a general positive affective function.



Eliciting and identifying patterns of gesture behind everyday science concepts

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Gesture studies have drawn attention to the importance of embodied representations underpinning thought in domains including science and mathematics (Novack, Goldin-Meadow & Woodward, 2015). However, little is known about the degree to which children's gesturing aligns with the science ideas they aim to express. Such research has particular value for young children whose knowledge is often assessed on linguistic abilities (Brenneman, 2011), despite the likelihood of developing visual and motor imagery underpinning certain concepts before being able to express their thinking verbally (Kontra, Goldin-Meadow & Beilock, 2012). Given the importance of spatial-dynamic relationships in science concepts, it is possible that children are able to demonstrate their emergent understanding through gesture (Alibali & Nathan, 2011; Sauter, Uttal, Alman, Goldin-Meadow & Levine, 2012). This study aims to fill this gap in knowledge by first assessing the gesture repertoire of adult science experts. By capturing this, adults' gestures can then be used as a benchmark to capture the development of children's gesture, and thus offer greater recognition of children's capacity in areas such as science.

Following a review of gesture elicitation literature, three different methods were employed to explore the patterns in the types of representational gestures science educators use to communicate core science concepts, i.e. what kinds of questions elicit what kind of body-based reasoning. To do this we conducted three studies adhering to design-based research methodology observing language, spontaneous gesture, and intentional gesture to (1) examine adults' explanations about specific science concepts, (2) examine adults' problem-solving rationale about particular science concepts when given a task, and (3) examine adults' problem-solving reasoning about particular science concepts when given a related image using a *predict/observe/explain* format.

All studies were video-recorded and speech and gesture were systematically analysed. A key finding was that all three methods elicited gesture, and that adults' gesture-use appeared to be pervasive. Video-clips shown in the talk will further reveal that certain gestures appeared to be universal for science concepts that had obvious spatial-dynamic relationships e.g. friction, in comparison to others that did not e.g. heat, where interesting differences in gesture were found. These will be discussed in relation to the abstraction of representational gestures, and the gestures used in British Sign Language for the same science concepts. Additionally, results showed differences in gesture type according to the adult's level of science expertise, science communication experience, and experience of working with younger children.

This study has informed appropriate gestures educators could use when teaching young children science concepts based on the abstracted representational gestures of science experts. The gestures children use therefore, provide a unique opportunity to capture children's thoughts around certain scientific ideas and demonstrate how they can be leveraged to support learning (e.g. Novack *et al.*, 2015).



Young children's conception of number gestures

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How do children transition from preverbal conceptions of numerical quantity to a full understanding of symbolic number (e.g. number words)? A surprisingly unspecified aspect of early number development is children's use of cardinal number gestures (e.g. holding up three fingers to indicate "three"). Although, such number gestures are ubiquitous and widely assumed to play a role in children's early number development, the specifics of this role are not well understood.

One proposal is that number gestures serve as a bridge between nonsymbolic and symbolic representations of number. Cardinal number gestures are iconic in that they represent quantity through direct one-to-one correspondence between fingers and the items in a set. They can also be used as summary symbols to represent and communicate about specific quantities (akin to number words). Previously, we have shown that children who are in the process of learning the meanings of number words are more accurate when labeling sets using gestures than speech, suggesting they take advantage of the iconicity of number gestures.

More recently, we examined whether children's conception of number gesture goes beyond purely iconic, item-based representations to something more closely resembling symbolic number words. In Experiments 1-3, we compared preschool children's ability to identify the number of fingers raised in number gestures to their ability to identify the number of dots in an array. In both instances, the gestures or dot arrays were presented for 1 second on a computer screen in order to prevent children from counting. The results showed that unlike children's estimation of dot arrays, which became less accurate as the size of the set increased, children remained surprisingly accurate when identifying the number of fingers in the gestures for 1 through 5. This suggests that when enumerating number gestures, children did not rely on the same numerical estimation system that they employ when enumerating dot arrays, indicating that they may map quantities to the overall configuration of canonical number gestures.

To test this, Experiment 4 also presented children with 1-second displays of number gestures. On key trials, the number of fingers in the gesture conflicted with the configuration of the gesture (e.g. one finger was digitally removed to give a hand four total fingers but all those fingers and thumb extended into a canonical five-gesture configuration). Analyses revealed that young children's estimates of the number of fingers in each gesture reflected the configuration and not with the actual number of fingers, suggesting children form configuration-number mappings akin to arbitrary symbolic representations of number. Together these findings support the view that number gestures could serve as a useful bridge between nonsymbolic and symbolic conceptions of number.



Children's use of gestures to mark narrative structure

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Narrative is a complex type of discourse generally consisting of alternations between narrative information proper (all mentions to events of the story) and extranarrative information (references to the structure of the story or commentary on the narrator's own production) (Labov, 1972; Stein & Glenn, 1979). Cassell & McNeill (1990, 1991) and McNeill (1992) propose that different kinds of gesture are differentially distributed over the narrative structure, providing clues on the process of narrative elaboration, such as the narrator's choice of perspective or the transition between levels of information, thus contributing to creating discourse cohesion.

Developmental research has shown that narrative competence is based on the increase of cognitive abilities and textual strategies (Berman and Slobin, 1994). In addition, there is evidence that children's gesture production also changes as a function of their language complexity, and their cognitive and pragmatic abilities (Capirci *et al.*, 2011; Colletta, 2004; Graziano, 2009). Yet, little is known about how the alignment between gesture functions and narrative structure may change over time.

The aim of this study is therefore to investigate this issue by comparing narrative structure and gesture functions distribution in narratives produced by 33 Italian children (4-, 6- and 9-year-olds) and 12 adult Italian speakers. Narrative structure was analyzed in terms of narrative levels (narrative, metanarrative and paranarrative; McNeill, 1992). All gestures were identified and coded for function (referential vs. pragmatic; Kendon, 2004). Gesture function distribution over the three narrative levels was analyzed.

Preliminary results indicate that 1) narrative structure is similar in all groups of children with a predominance of narrative clauses, while adults produce more metanarrative clauses than children; 2) gestures are overall functionally aligned with narrative structure: both adults and all groups of children mainly produced referential gestures with narrative clauses, and pragmatic gestures with metanarrative and paranarrative clauses; 3) moreover, the use of pragmatic gestures shows a developmental trend with a steady increase at age 9.

Overall, the findings support McNeill's proposal about the gestural alignment to the narrative structure, thus reinforcing the view that speech and gesture are orchestrated together in order to arrange information in discourse and achieve cohesion. The data also indicate that a developmental change occurs at the age of 9 when co-speech gestures are used in a similar way to adults (both representing and commenting on one's own production). Although, globally, the structural organization of the narration does not show significant difference in three child age groups, a qualitative analysis shows a link between the development of pragmatic gestures and the usage of different types of connectives. This further supports the notion that the two modalities develop in parallel.



Parental verbal responses to infants' index- and hand-points

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Early gestural communication predicts later linguistic skills, both for typically developing children [1,2], and children with developmental communication disorders [3]. This relation has been found for pointing gestures in particular [e.g. 4,5]. Some researchers have focused on different hand shapes of infants' points, namely index-finger and whole-hand pointing [6-9], and how they are associated with different communicative purposes [6,9]. Also, their relation to subsequent linguistic skills was studied [7,8] and it was shown that index-finger pointing at 12 months predicts infants' typical language development at 2 years [7].

One approach to explain this relation is to study caregivers' responses to infants' pointing: in fact, infants' pointing was shown to elicit verbal labels from caregivers, and the frequency of such 'translations' was correlated with the onset of two-word utterances [10]. Analyses of caregivers' verbal responses dependent on different hand shapes of infants' pointing at 12 months revealed no quantitative or qualitative differences of the responses following index-finger or whole-hand pointing, respectively [8].

For our further analyses of these data, we adapted the coding scheme used in [8] and looked at caregivers' responses not only at 12 months, but also at 14 and 16 months. When coding the responses, we considered whether pointing was accompanied by verbal utterances or not. The response categories included *translation*, *elaboration*, *affirmation*, *question*, and also *non-verbal movement towards the referent*. We also coded the cases when points did not receive a response.

We hypothesized that parents respond more often and more specifically to index-finger pointing (as the conventionalized form of pointing in many, though not all, cultures). Further, we were interested in whether different forms of pointing-speech-combinations elicit different responses.

To observe spontaneous pointing and verbal utterances, 70 monolingual German infants and their caregivers were observed longitudinally in the decorated room [11], beginning when infants were 12 months old.

Preliminary results show that when infants were 16 months of age, the proportional number of total verbal responses following index-finger or whole-hand points was comparable ($p < .05$), thus not supporting our assumption that caregivers responded more often to index-finger points. However, with regard to a specific response category, we found that parents responded to index-finger points proportionally more often with *elaborations* than to handpoints ($Z = -3.51, p < .001$).

For the pointing-speech-combinations, we found that already at 12 months, the index-finger points accompanied by words received proportionally more verbal responses than handpoints with words ($Z = -2.9, p = .004$). At 16 months, there was a tendency for this difference ($Z = -1.19, p = .056$).



In further analyses, we will compare the amount of different types of responses, and also relate these variables to children's later vocabulary development.

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The function of conversational behavior in establishing co-construction of understanding: Multimodal analysis in face-to-face interaction focusing on gestures

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The aim of this study is to look at face-to-face interaction between non-native speakers who do not share the same language, focusing on utterances and gestures, and to explicate the process of how gestures employed in their interaction contribute to the co-construction of understanding. Previous studies of gestures in interaction have focused on particular types of gestures and on the range of functions employed by same-speaker gestures or other-speaker/recipient gestures such as iconic and deictic (Kendon & Versante, 2003), as well as the relationship between gesture and speech (Kita, 2003). Little research so far has analyzed gesture in interactions in the process of co-constructing understanding sequentially by a speaker and a listener. The author thus attempts to clarify how gestures are devised in the course of turn-taking and then used to negotiate and overcome problems of understanding between a speaker and a listener. The author examined two video-recorded face-to-face interaction data between non-native speakers of English, namely a Japanese student and one international student from Malaysia, and also between non-native speakers of Japanese, namely a Vietnamese and a Nepalese, at a Japanese university. As can be seen, two interactions conducted in English and in Japanese are the basis of this study. The author has taken an emic approach and employed multimodal analysis using conversation analysis transcription conventions. The author attempted to address instances where difficulty in understanding is displayed overtly and explicitly through repair sequences. Based on McNeill (1992), gestures are classified into four types: iconic, metaphoric, beat, and deictic. Preliminarily, we found two main results based on the recorded data. First, the participants in both interaction groups frequently employed gestures in the course of their interaction together with what s/he is willing to express something verbally. Although this is a tentative result, it is evidence of the use of gesture as a common means employed in turn-taking. Second, the participants in both groups employed gestures more often when overcoming problems in understanding. Interestingly, they addressed their interlocutors with body and hands movements to fulfill different functions. In this presentation, we will consider how the participants negotiate and co-construct understanding through the use of gestures which they employ overtly in the course of interaction.



Gesture's potential for creativity: Not “mere” communication and spatial thinking

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The inspirational qualities of gestures are seldom discussed. Limited is also research on gestures in the context of creative collaborative designing (Cash & Maier, 2016). The majority of that research centres on gestures' communicative features (conveying intended meanings and orchestrating collaboration), while some account for gestures' strength in spatial cognition, which is elemental for design disciplines such as architecture, product and textile design. Most findings are generalizable over domains of teamwork, yet a handful of studies (Cash & Maier, 2016; Eris *et al.*, 2014; Murphy, 2012; Visser, 2009) aim to identify features that serve the essence of designing: the generation of novel ideas. However, the core of generativity (the mechanisms behind creative ideas) remain unknown; likewise, the roles of gestures in generativity. Ample potential for gesture research resides within design.

This presentation reports three studies aimed at enlightening how gestures serve creative idea generation. The research setting included two textile design projects: three-dimensional functional textile puzzles for visually impaired children and sea creature accessories for kindergarten children. The data comprised five teams, each of three design students.

Four teams designing accessories participated in the Study I, which compared the use of words and gestures to express materiality. Materials are central in providing inspiration and “user-interfaces” when developing design concepts. Our results showed clear specialisation: words were used to name materials and describe visual qualities, gestures for material behaviours, visuo-spatial and tactile aspects.

One team designing a puzzle participated the Study II, which compared the use of sketching and gestures with co-speech in conveying design-relevant meanings. Our findings showed that over half the gestures were non-redundant; likewise, nearly all sketching. Sketching was used for structural exploration, while gestures were more versatile. Gestures were preferred to speech or sketching when inclusion of spatio-motoric and experiential content or understanding of motor-actions and action-sequences were required.

In both studies, gestures channelled embodied experiences more precisely and richly than words. Gestures provided non-redundant design-relevant meanings and conceptualisations that differed from words. They also facilitated team-level shared understanding and embodiment of conceptualisations (LeBaron & Streeck, 2000).

From the Study II data, two types of sequence were identified for the Study III. Consecutive gestural strokes produced by single participants revealed vivid gestural ideas. Participants repeating each other's gestures revealed a continuity in the gestural idea development.

Conclusions. The ambiguity of gestures could be central to generativity as it supports the multiple interpretations considered essential to design ideation. Gestures provide numerous “additional” design-relevant meanings and a spatio-kinaesthetic channel for conceptualisation. Together, these provide an inspirational feed and substantially increase the potential for generativity. Research in the design context complements previous views—gestures as



communication, spatial cognition, a way of thinking—with gestures as resources for idea generation and creativity.

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Give the future car a hand!

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Car manufacturers increasingly offer gesture controls in their vehicles. The creators of gesture commands, themselves coming from the areas computer science, human-computer interaction or user experience design, hardly ever collaborate with gesture researchers outside of technological-focussed fields. This may be one reason for three limitations of current gesture controls by manufacturers such as Volkswagen and BMW. The gesture commands are: (i) often arbitrary (e.g., approaching device with vertical hand palm facing ahead to take a call); (ii) limited to binary tasks (e.g., opening *or* closing the sun roof); and (iii) do not consider the dynamic spatial surrounding (e.g., both examples above). This is unsatisfactory because a car journey involves travelling through 3D space and passing by potentially relevant spatial entities. Another prominent occupation when driving—planning and revising the route—is a highly spatial task. Two ubiquitous natural gestures are pointing at something with a single finger and indicating a direction with a flat hand, palm facing sideways, moving on the sagittal plane (Fricke, 2007; Haviland, 2003), gestures that are highly appropriate for in-car gesture controls (Tscharn *et al.*, 2017). Both of these gestures overcome the three limitations mentioned above, in that they: (i) are iconic; (ii) can be performed in 360° horizontal and 360° vertical variation; and (iii) connect the driver to the world outside of the car because they can refer to anything that is visible and adapt dynamically to the spatial situation (pointing at an object that passes by requires continuously adjusting the pointing hand). While pointing and directing afford these liberties, they also have constraints with regard to movement and configuration (Hassemer & McCleary, *subm.*; Hassemer, 2016) which can be helpful for optimising gesture recognition.

Besides showing Gesture Form Analyses (*ibid.*) of the proposed gestures, the concept of a new generation of gesture controls will be presented, which makes use of these and other analogue and intuitive gestures. It exploits the additional time and space offered by autonomous driving, which does not require a steering wheel and gives its passengers more time and concentration for meta-driving tasks, while also embracing smart mobility solutions). I will also report on my experiences of shooting a video clip to showcase the concept, and the feedback from car manufacturers to a theoretical, gesture-specific proposal.

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An account of the structural diversity in pointing gestures

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This paper considers “gesture form” to include two kinds of form that are crucial in perceiving a gesture: the physical form of the gesturing body as well as imaginary forms that are necessary to understand a bodily action as a gesture. Gesture form so defined is proposed as the basis of meaning in gestures. (Hassemer & McCleary, *subm.*; Hassemer, 2016).

We focus on pointing gestures, that is, gestures whose dominant function is the reference to a physical or imaginary object or a portion of space. The large variety within the fuzzy boundaries of what is called pointing or deictic gesture can be categorised into types each of which is made up of multiple forms of different dimensions. The analyses in this paper comprise a typology with two major branches: one, in which the articulator is profiled as a line; and another, in which the articulator is profiled as a surface. Perhaps surprisingly, some pointing gestures are found not to include a feature commonly associated with pointing: a vector or a line; and the branch of pointing types with the largest structural variety turns out to be those with a surface profile. We make the highly falsifiable claim that permutations of seven distinct spatial operations in sequences of two to six operations explain the emergence of all constituent forms in the 27 gesture types that can be used for pointing. The constituent forms will be shown to afford one or more of the following functions: (1) communicating location or direction (associated with deixis); (2) representing linear, surface-like or volumetric forms (associated with iconicity); as well as (3) various non-spatial functions (e. g., illocutionary, interpersonal, discursive). Thus, the gesture form approach to typology is shown to relate form and function in a systematic way.

The analyses resonate with Talmy’s perspective of “gestures as a cue to a target” (Talmy, 2018); draw on the systematic insights into how a gesture creates imaginary forms by Mandel (1977), Mittelberg and Waugh (2009), Müller (1998) and Sowa (2006); and apply to the modality of gesture the theoretical findings in language semantics regarding the neutrality of close-class terms of “magnitude”, “shape” and “closure” (Talmy, 2000: 26-31) and regarding “profiling” in the construal of an expression, that is the focussing of attention on one aspect within its entire conceptual content (Langacker, 2008: 66-67).

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How does gesture influence visual attention during mathematical learning in college students?

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It is clear that adding gesture to instruction in mathematical learning enhances learning (e.g., Alibali *et al.*, 2013; Cook, Duffy, & Fenn, 2013; Singer & Goldin-Meadow, 2005). However, the mechanism underlying this effect is not clear. We explored the role of gesture on the learning of an abstract mathematical system (e.g., Kaminski *et al.*, 2008), investigating how gesture in instruction may influence visual fixation, using eye tracking methodology (Gullberg & Holmqvist, 1999; Gullberg & Kita, 2009; Beattie, Webster, & Ross, 2010), and how that may relate to learning (Silverman, Bennetto, Campana, & Tanenhaus, 2010).

Sixty-four undergraduate students were recruited for this study. Participants were randomly assigned to instructional conditions with either speech alone or speech and gesture. The instruction, conveyed through carefully-matched video-recorded lessons, centered on solving simple problems in a symbolic commutative group of order three. Participants returned for a second test 24 hours after initial training. The participants wore a head-mounted eye tracker across both days of assessment.

A multilevel logistic regression model was used to examine differences in performance across conditions while accounting for individual subject variability and problem difficulty. Results reveal that participants learn more in the gesture condition, compared with the no gesture condition. We also examined patterns of fixation during instruction. Participants in the no gesture condition spent less time looking at the problem, and more time looking at the instructor. Furthermore, the timing and robustness of fixation patterns varied across the two conditions. Participants generally first looked to the left side of the equation, then the equal symbol, followed by the right side of the equation and finally the instructor. To compare the robustness of looking across conditions, we extracted the time windows when there was robust activation to particular regions across the entire data set. Participants tended to look at the left side of the equation in the time window from 125 frames to 225 frames after the onset of the video (from 4-7 seconds) and they tended to look at the right side of the equation from 425 frames to 525 frames (from 14-17 seconds). We then predicted looking in these time windows across the two conditions. In both of these windows, looking to the predicted element was enhanced in the gesture condition.

Ongoing analyses investigate the extent to which learning can be predicted from patterns of fixation during learning, as well as the extent to which gesture influences pupillometry, which is a measure of attention and engagement.

These data reveal that gestures are an effective tool for directing attention during instruction. By directing attention away from the instructor and toward relevant information in the environment, gesture may help learners construct new knowledge.



Transfer in gesture: L2 descriptions of placement events

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The semantic information in placement verbs may differ across languages. Speakers of English tend to use the general placement verb ‘put’, which can be used to describe most placement events, regardless of the object being placed and the manner of placement (e.g. ‘I put the cup on the table’). Speakers of Dutch however, have to choose between two more fine grained placement verbs, and this choice depends on the object and on whether the object is being placed in a vertical manner (‘*zetten*’) or in a horizontal manner (‘*leggen*’). This means that for speakers of Dutch, not only the movement but also the object matters, as this determines which verb needs to be used.

This language specific meaning of placement verbs can be reflected not only in speech, but also in gestures (Gullberg, 2011). Previous work showed that speakers of English, in line with the general placement verb ‘put’, produced many gestures indicating only the path of the placement event (Gullberg, 2009). Speakers of Dutch, on the other hand, often produce gestures which indicate a focus on the object being placed, by showing specific object related handshapes (Gullberg, 2011). Given this difference in placement verb focus between Dutch and English, a question is whether gesture production during L2 placement event description can indicate whether transfer in placement verb meaning from the L1 occurs.

To study this, 10 speakers of Dutch took part in a placement event description task in English. The task was identical to the one used in Gullberg (2009, 2011). Participants had to describe 32 video recorded placement events in English to a non-Dutch interlocutor. For each placement event, it was annotated which placement verb was used, whether a placement event gesture occurred, and if so, whether this gesture showed only the path of the movement, or also an object incorporating handshape.

Results showed that Dutch L2 speakers of English overwhelmingly correctly used the verb ‘put’ to describe the placement events (65% of all cases). This suggests that speakers acquired the L2 meaning of the placement verb. However, when looking at gesture production, it was found that in 64% of the 181 gestures, participants produced a gesture with an object incorporating handshape. This percentage differed from chance level (binomial test, $p < .0001$). This suggests that even though speakers were native-like in their speech production, gesture production showed that there was L1 transfer in placement verb meaning, apparent by a remaining focus on the object of the placement event.

This study shows that L1 transfer may exist, even in a relatively simple switch from fine grained L1 to general L2 placement verbs, and when L2 speech production is native-like. Gesture analysis can serve as a tool to uncover this process.



More than “co-speech”: Gesture in multimodal depictions

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Depictions, defined by Clark (2016), are physical scenes people create and display with a single set of actions at a single place and time for others to use in imagining the scenes depicted. In this sense, depictions make up the part of communication where the relation between the semiotic signal and its denotation is iconic rather than symbolic (*cf.* descriptions) or indexical (*cf.* indices). Based on the relation between a depiction and its adjacent or accompanying utterance, Clark identifies four types of depictions: independent (where the depiction stands alone), embedded (where the depiction takes up a syntactic slot in a descriptive utterance), indexical (where the depiction is indexed by an index), and adjunct (where the depiction accompanies and illustrates a descriptive utterance).

Curiously, where gesture is concerned, although research on gesture as an integral part of communication has flourished (Fricke, 2012; Kendon, 2004; McNeill, 1992), most studies focus on phenomena that fall under the categories of adjunct and indexed depictions, looking at gestures that “complement” or “augment” speech (Bavelas & Chovil, 2000; Bressemer, 2014; but see Ladewig, *forthc.*). Insightful as the studies are, they overlook cases where gesture can be more than “co-speech”; that is, where gesture plays not the secondary role but acts as the primary vessel of meaning.

In view of this, video recordings of masterclasses retrieved from MasterClass.com were examined, given by three instructors and on three subjects. While relevant tokens abound, the focus is laid on embedded depictions, which fill in syntactic slots in utterances like canonical verbal constituents do, and which thus tend to activate syntactically bounded meanings. A total of 100 tokens of embedded depictions were collected from ca. five hours of data. Pairing multimodal signals with functions, embedded depictions effectively serve as multimodal constructions (Goldberg, 1995; Zima & Bergs, 2017). For instance, an instructor was observed saying “It’s only gonna take that *bam* amount of time,” clapping his hands once at “*bam*,” thereby depicting the transience of the event. The manual gesture (clap) and vocal gesture (“*bam*”), paired, form a multimodal construction, occupying a syntactic slot where a verbal constituent would otherwise be, communicating meaning to the addressee. Apart from tokens where gesture is the primary carrier of meaning, tokens were also observed where gesture and speech co-construct meaning: Signals from both channels make crucial and indispensable contributions to the composite meaning (Langacker, 2008) of the resulting multimodal construction, neither of the signals playing only a complementary role. A preliminary inquiry into gestures that are more than “co-speech,” the present study points to a dimension of meaning contribution from gesture that has yet to be fully explored.

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List construction and list constructing in gestures: A view from Israeli Hebrew

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List construction has been defined as a junction of two or more elements occupying the same structural position in a dependency structure (Blanche-Benveniste et al. 1990). From a more cognitive perspective (cf. Langacker 1987), the phenomenon of lists has been analyzed as a symmetric construal of a specific relation between two or more conceptual entities, mirrored in discourse by the juxtaposition or explicit connection of chunks that speakers process together (Blakemore 1987).

In this talk, I will present the first analysis of gestures used for the expression of lists in spoken Israeli Hebrew. To this end, I compiled a 20-hour corpus of TV interviews in Hebrew with over 50 speakers. Taking the ‘usage-based’ perspective, I will examine the functional distribution of the revealed gestural patterns.

It will be shown that different gestural patterns may distinguish between lists as linguistic units (list constructions) and lists as cognitive processes (list constructing). In other words, the revealed gestural patterns can operate at the syntactic level, presenting the syntactic structure of lists in different ways; however, other gestural patterns can operate at the cognitive level reflecting the process of list constructing.

Moreover, lists show a great degree of functional variation, and it was found that particular gestural patterns are systematically associated with particular functions of lists. For example, gestures can reveal different purposes of list constructing, such as building a higher-level category while focusing on the members of this category or on the category itself (Ariel & Mauri, in press).

To summarize, the study of gestures associated with list constructions can contribute to a systematic analysis of lists at different levels of analysis. Different gestural forms may distinguish between pragmatic aspects of list constructions that are not expressed in Hebrew grammatically. On the other hand, analyzing the contexts in which the gestures that indicate syntactic structure are used may explicate the syntactic status of specific constructions that are questionable regarding to their relevance to the list constructions (cf. Bonvino et al. 2009, Blanche-Benveniste 1987, Guénot 2006, Overstreet 1999). Should repetitions or reformulations be treated as list constructions? Should general extenders be captured as listees or as external elements?

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Several mother tongues, one gesture: Meaning construction in the foreign language classroom

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In the classroom, foreign language learning takes place in a multimodal manner. The participants – the teacher and the learners – use multiple means to construct meaning, e.g. verbal expression, prosody, gesture, space and objects. Gestures form a part of human beings' everyday communication, but how are they used in a situation where the goal is to express oneself verbally in a foreign language?

The aim of the present study is to examine how teachers and learners with different mother tongues use gestures to construct meaning for new words in the foreign language classroom. For this purpose, Estonian and French language lectures were videotaped in a university. In these lectures, all communication was done in the foreign language itself. 110 episodes of communication involving meaning construction for new vocabulary items were selected for the analysis. All audibly and visually perceivable communicative actions of all the participants in the lecture were transcribed in order to enable the combination of multimodal discourse analysis and micro-ethnographic research.

Some studies (e.g. Lazaraton 2004, Taleghani-Nikazm 2008) focus on how the teacher uses verbal expression and gestures to construct meaning for new vocabulary items. The present study pays equal attention to the teachers' and learners' gestural activity and use of other resources in meaning construction for new vocabulary items. The results of the study may help teachers to use more consciously the multimodal interaction in their classes.

The results show that both teachers and learners often use gestures to complement and substitute the verbal expression when constructing meaning for new vocabulary items. The analysis reveals that in the situations of meaning construction for new words: 1) the participants use mainly iconic gestures; 2) the gesture can be the only meaning constructor for the new word; 3) participants with different mother tongues can repeat or even simultaneously perform gestures which are similar in their physical form.

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Constructed action types and eye behavior in Finnish Sign Language

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This paper investigates eye behavior and constructed action (CA) in Finnish Sign Language (FinSL). CA is a form of gestural enactment in which signers use different parts of their body to represent the actions, thoughts, feelings and sayings of referents in the discourse. This enactment has degrees, which makes it possible to classify CA on an articulatory continuum into three prototypes: overt, reduced and subtle CA (Cormier *et al.* 2015). The number and use of articulators in the three types varies according to what is being enacted but in general the eyes are considered to have a special status in the production of all CA: when signers begin CA, their eye gaze typically breaks away from the addressee and the eyes begin to represent those of the enacted referent (e.g. Ferrara & Johnston 2014, Cormier *et al.* 2015).

However, not much is known about the interaction of eye behavior with CA types. In order to better understand this relationship, the present work looks at eye behavior (e.g. blinks, saccades, eye gaze) at the beginning of the CA in 25 short narrations, elicited with the help of cartoon strips from 5 FinSL signers in a dialogue situation. During the signing, signers wore a head-mounted eye tracker which produced numerical and video data of the pupil behavior and gaze direction of the left eye. All the material was synchronized in ELAN and annotated for signs, translations and CA. The CA annotators followed the guidelines presented in Cormier *et al.* (2015) and also coded the three CA types explicitly. Eye behavior was analyzed in terms of all the CA in the narrations and just the first CA in each narration.

In general, the results show that the three types of CA are associated with different kinds of eye behavior. Concerning overt CA, a break or shift in eye gaze from the addressee at the beginning of the CA happens almost obligatorily and the eye gaze of the CA is always enacting. In reduced CA, there is a strong tendency towards a break or shift in eye gaze at the beginning of the CA and the eye gaze is enacting most of the time. Finally, in subtle CA, there tends not to be any major break or shift in eye gaze at the beginning of the CA and the eye gaze is enacting only sometimes.

The main conclusion of the present study is that the lower the CA, the more unreliable is eye behavior as an articulatory cue of CA. In our presentation, we will present the results and discuss their implications in more detail.

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Gesture during speech disfluencies: A functional analysis

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Speech and co-speech gesture are coordinated in interaction, expressing the same idea through different modalities (McNeill 2005, Kendon 2004, De Ruiter 1998). This semantic and pragmatic link results in synchrony of speech and co-expressive gesture. When there is a disfluency on the speech level, this therefore often co-occurs with a disfluency on the gestural level. Studies on the distribution and coordination of speech and gesture disfluencies showed a clear link between the two phenomena (Seyfeddinipur 2006, Esposito & Esposito 2011). To date, however, the way in which a gesture was interrupted did not yet receive much attention. Different researchers furthermore use a different terminology for the concept of the interruption of gesture: gesture interruption, gestural disfluency, gesture suspension or gestural hold, to name a few (Seyfeddinipur 2006, Kosmala & Morgenstern 2017, Esposito & Esposito 2011). What these concepts exactly denote, and how they are different from each other, remains somewhat unclear.

This paper contributes to the study of gestural disfluency by starting from the verbal level. In a multimodal video corpus of unscripted two- and three-party interactions (in Dutch), different kinds of verbal hesitation markers were singled out: filled pauses such as ‘uh’ and ‘um’, empty pauses, repetitions and reformulations. The speakers’ accompanying gestures were analyzed with respect to form, function and timing.

A qualitative analysis revealed several gestural patterns accompanying verbal disfluencies, which show a disruption of gesture coordinated with speech disfluencies. The characteristics of this disruption, however, may be diverse. When speakers were gesturing before the hesitation marker, they either stop moving and hold their hands in the gesture space (the “gestural hold”), change the movement pattern of the gesture for the duration of the hesitation marker (for example in a cyclic or fluttering gesture), or bring the hands back to rest position just before the start of the hesitation marker. When speakers did not gesture before the speech disfluency, they either wait with the onset of the gesture until after the hesitation marker (most frequently), or start gesturing already during the hesitation marker (the so-called “Butterworth” gesture commonly used in word searches, McNeill 1992).

This difference in gestural patterns may correlate with a functional difference on the cognitive and/or interactional level. A coordinated disruption of speech and gesture seems to reveal a cognitive planning problem whereas the occurrence of gesture during the hesitation marker can be argued to indicate a purely verbal word finding issue. On the interactional level, the frequent return of the hands to rest position at turn endings contrasts with an ongoing or held gesture in turn-medial position. In this respect, a continuation of gesture seems to project a continuation of talk.



Semiotic diversity across the lexico-grammar in Auslan: A window on other signed languages too?

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It has been proposed that the manual signs of Auslan (Australian Sign Language) display, to borrow Kendon's (2014) expression, semiotic diversity. These signs range from highly conventionalized in form and meaning to weakly conventionalized (authors; see also Janzen 2012, 2017). Treating signed strings in signed language (SL) utterances as if all the signs were of the same semiotic type is potentially very misleading, especially when used to make claims about syntax. We present an analysis of over 10,000 clauses (40,000 manual signs) from the Auslan Corpus and show that a cline of conventionalisation can similarly be said to apply to clauses. With respect to clauses, it applies to both the types of individual symbolic units (signs) within a clause, and the clause itself as a conventional symbolic unit. In other words, some clauses may be less conventionalized than other clauses because (i) they contain one or more constituents that are themselves low in conventionality, or because (ii) clauses in the language have not themselves undergone grammaticalisation (known as syntacticisation by Givón 1979, 2009) in some respect, e.g., they do not have grammatical relations. In support of this, we provide quantitative and qualitative data on coding and behavioural properties that have been associated with grammatical relations cross-linguistically and show that they cannot be identified unambiguously for Auslan. These data include (i) the alignment of semantic roles of arguments with their constituent order in the clause and/or the presence or absence of morphemes that encode grammatical relations (i.e., a coding property), and (ii) constraints on the interpretation of zero anaphora in clauses complexes, e.g., coordinated clauses (i.e., a behavioural property). We also provide data on the distribution of semiotic sign types found in clause-like units in Auslan. We conclude that semiotic diversity is manifested in Auslan across the lexico-grammar, not just at the level of the individual sign. We suggest this should be expected in SLs: they display semiotic diversity within the same modality (in a sense SLs are uni-modal compared with spoken languages which are multi-modal). So much (but not all) of the semiotic diversity in SpLs manifests itself visibly (in gesture) and this underlines the notion of multi-modality. Both modalities, nonetheless, display semiotic diversity. We conclude that some gestural elements remain gestural in SLs, and the SL utterance units of which they are a component do not instantiate a syntactic construction based on grammatical relations. In brief, some symbolic constructions in SLs, be they single sign or multi-sign units, may be enactments, some may be visual representations, some may be complex mixtures of both representational strategies with lexical signs, and finally, of course, some are composed only of lexical signs.

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Use of pointing by young hearing children of Deaf parents

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During early language development, pointing has a multifaceted role in language acquisition and communication. In interaction, pointing functions as a key element of triggering joint attention (Tomasello, 2003). Pointing predicts lexical development, as children tend to point at an object before naming that object (Iverson & Goldin-Meadow, 2005). Use of pointing also precedes children's syntactical development before the two-word/sign phase regardless of the language they are acquiring (Capirci *et al.*, 2002; Morgernester, 2014; Özçalışkan & Goldin-Meadow, 2005).

However, pointing has somewhat different roles in spoken language and sign language. Spoken languages are produced in an auditory-vocal modality that differs from the manual modality of pointing. Thus, it has been widely acknowledged that pointing is produced along with speech and is accompanied by speech semantically and temporally. As pointing shares the same modality with sign language, this affects the way pointing can be integrated with signs. Furthermore, in recent studies there have been discussions among researchers on the role and function of pointing in sign languages in general (Johnston, 2013; Cormier, Schembri & Woll, 2013). This study focuses on pointing used by young KODAs (Kids of Deaf Adults). KODAs simultaneously acquire both sign language and spoken language. The aim of this study was to analyse pointing's functions in different interaction contexts and the way KODAs combine pointing with signs and words during their early bimodal bilingual development.

Eight KODAs were video-recorded every six months between 12 and 36 months of age in two different play sessions: with their Deaf parent and with a hearing adult. All signs, words, other gestures and points were transcribed from the data. The points produced by the children studied were analysed to determine whether the pointing was directed towards a person or another referent. Utterances where the children combined two points to different referents or combined points with words or signs were also analysed. The coding criteria were based on previous research on sign language and language acquisition (Johnston, 2013; Özcaliskan & Goldin-Meadow, 2009).

The results showed that, with the Deaf parent, KODAs produced more pointing in general and directed their pointing towards a person more often than in the play session with the hearing adult. The children mostly combined pointing only with a word(s) when communicating with the hearing adult. However, with the Deaf parent the children used more varied types of combinations; combining points with signs, other points towards different referents and other gestures. During early bimodal bilingual development, points seemed to be part of the deictic system that children benefited from during interaction regardless of the language they used. The results also suggested that the deictic system is integrated with speech and signs in a highly synchronic and language-specific way.

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Mutual re-enactment of individual experiences: Co-participated embodied recounting of individual experiences as a resource for interpersonal coordination and intercorporeal sense-making

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Some of the most vivid and crucial moments in social interactions are those where people engage in similar emotional experiences. Jointly coordinated affective activities such as laughing together in contexts of enjoying the same attitude towards shared experiences are a fundamental part of intimate relationships and establishing interpersonal bonds. Prior studies of stance and affect in interaction have shown how participants collaboratively take up emotional stances towards objects and activities in their local environment and that sharing emotional stance with someone towards some third entity plays an important role in structuring local action as well as maintaining social groups and relationships (C. Goodwin, 2007; M. H. Goodwin, Cekaite, & C. Goodwin, 2012).

In this study, we adopt micro-interaction analysis to investigate a moment in a naturally occurring interaction between two participants in a group of non-native Finnish mothers where *firstly* the participants produce reciprocal social actions about mutual affectively laden past experience, and *secondly*, how this embodied dialog evolves into an affectively rich moment where the participants re-enact these mutual individual body memories through collaborative gesturing. Accordingly, in the moment-by-moment unfolding interaction, the participants effectively *relive* together their individual body memories as if they were interbody memories (Fuchs, 2017:10), that is, as if the participants would have experienced the past events together. These findings are in alignment with prior interaction studies suggesting that experiencing some form of sharing or similarity, such as experiencing together affectively rich encounters (M. H. Goodwin, 2017), having similar past experiences (Pudlinski, 2005), enacting into synchronous body movements (Rennung & Göritz, 2016), or sharing similar emotional stance towards objects and activities (e.g M. H. Goodwin & Cekaite & C. Goodwin, 2012) have prosocial consequences in interaction. This article argues that both the actual similarity of the participants' body memories and the interactional process where the participants collaboratively realize, perform, and celebrate the similarity, enable their performed and co-participated affective coordination with one another. Therefore, we suggest that interpersonal bonding is accomplished intercorporeally, in a process where individual bodies' moment-by-moment produce each other's sameness.

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Gesticulation portrait: A prerequisite for understanding gesture

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In face-to-face communication, interlocutors combine verbal structure, prosody, eye gaze, as well as facial, head, hand and torso gestures to produce integrated discourse. All of these communication channels are employed simultaneously and in conjunction with each other. Therefore, everyday communication is a multichannel process, Fig. 1.

Among the key issues in multichannel studies is the question of individual variation in a speaker's behavior. We explore this issue on the basis of the resource “Russian Pear Chats and Stories” that includes 40 recorded sessions (approx. 15 hours) of natural communication between four participants with fixed roles of Narrator, Commentator, Reteller, and Listener, as well as vocal, kinetic, and oculomotor annotations of these recordings. Each session includes two monologic stages and one interactive stage. Recordings were made with state of the art technology, including eyetracking, Fig. 2.

To capture individual variation, we use the notion of a speaker’s individual portrait that allows one to assess a vocal or kinetic event against the background of the speaker’s behavior. In our previous studies, we used Prosodic Portrait that is an important element of the process of vocal transcription, as well as Oculomotor Portrait. In this paper, we introduce the notion of Gesticulation Portrait (GP), necessary both at the stage of manual gesture annotation and at the stage of gesture analysis.

The GP elements relevant at the stage of annotation include: (dis)inclination to stillness, (dis)inclination to self-adaptors, typical amplitude, and typical velocity. For example, Participant 04C (Table 1) tends to be motionless for extended periods of time between gesticulation series. In addition, his gestures typically have large amplitude. Accordingly, a single weak movement of this participant is more likely interpreted as an instance of stillness rather than as a gesture.

The GP elements necessary for gesture analysis include the total number of manual gestures, their total duration, their mean, minimal, and maximal durations, as well as 25%, 50%, and 75% quantiles, as well as preferences in gesture handedness: predominance of two-handed or one-handed gestures and distribution of one-handed gestures in accordance with handedness. Speaker 04C (Table 1) prefers two-handed gestures, while most other participants demonstrate preference for one-handed gestures.

In our previous work the notion of Prosodic Portrait allowed us to establish the distinction between final and non-final falling intonation, a key to identifying equivalents of sentences in spoken discourse. Likewise, GP provides a framework for generalizations in the domain of gesture studies, such as: final vs. non-final gestures in a chain; kinetic differences between various functional types of gestures; differences between gestures in monologue and in conversation. In addition, the proposed methodology accounts for fine-grained annotation procedures and for accurate statistic analyses of multichannel data.



Using gesture to create new ideas: The self-oriented function of gesture for child and adult problem solvers

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The gestures that children produce when they solve problems can help them to create new ideas. Previous research has demonstrated that children's creativity can be boosted by asking them to move their hands while they think of novel uses for everyday items (Kirk & Lewis, 2017). In this talk, data are presented from a series of experiments with adults and children that probe the self-oriented function of gesture in problem solving and examine individual differences to consider why some people benefit more from gesture than others. In particular, the relation between verbal skills and gesture production are tested. Previously, Hostetter and Alibali (2007) found that adults with low and high phonemic fluency gesture more than adults with average phonemic fluency. The present research aimed to explore relations between gesture production and phonemic and semantic fluency in adult and child samples.

Experiment 1 tests the relation between gesture and creative thinking in an adult sample ($N = 82$), and explores differences in gesture production in relation to verbal skills. A significant positive correlation was observed between gesture production and creative fluency; adults who gestured more generated more novel ideas. Spontaneous gesture production was significantly positively correlated with phonemic fluency, but not semantic fluency.

Experiment 2 compares the contribution of meaningful versus non-meaningful movement to children's creative problem solving, and tests the relation between children's verbal skills (phonemic and semantic fluency) and their gesture rate. A sample of 40 children (aged 8 – 9 years) completed tasks to assess creative thinking (Alternative Uses Task; AUT), and verbal skill (phonemic and semantic fluency). The effect of encouraging children to produce meaningful versus non-meaningful movements on creative thinking was examined. Individual differences in gesture production as a function of verbal skill are discussed.

It has been suggested that gesture facilitates performance on the AUT because participants use gesture to explore the spatio-motoric properties of (imagined) test items. In order to test this explanation, Experiment 3 examines whether manipulating the affordance of objects impacts upon gesture use, and subsequently performance on a creative thinking task.

The findings of these experiments contribute to our understanding of the self-oriented function of gesture for both child and adult learners. Furthermore, individual differences data from adults and children help to elucidate the reasons why some people utilize gesture in problem solving more than others. Findings are discussed in the context of the Gesture for Conceptualisation Hypothesis (Kita, Alibali, & Chu, 2017).



Chunking in gesture can facilitate mental abacus problem solving

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The spontaneous gestures that we produce when we talk and think can be a powerful tool for problem solving (Beilock & Goldin-Meadow, 2010; Brooks *et al.*, 2017). This study explores gesture's role in Mental Abacus (MA) problem solving. MA is a non-linguistic technique in which users perform rapid arithmetic operations by imagining moving beads on an abacus, often while moving their hands as though manipulating the abacus.

Previous work has shown that planning gestures – rather than seeing or feeling them – is critical to MA problem solving: MA experts perform worse under motor interference, but show no deficit when blindfolded or made to keep their hands still (Brooks *et al.*, 2017). In the present study, we examined the form and content of MA experts' gestures in detail to gain insight into how different aspects of gesture planning may contribute to problem solving. We asked (i) whether experts vary in the informational content and complexity of their gestures, (ii) whether differences in gesture relate to their MA performance at baseline, and (iii) under motor interference.

Forty-five children who had received extensive abacus training in Gujarat province, India ($M_{\text{age}} = 10.71$, $SD_{\text{age}} = 1.80$, range = 7.0 – 14.0) participated in the study. All participants both solved and explained six MA problems. Their gestures were coded for informational content (column, trajectory, number of beads) and complexity (the number of abacus steps “chunked” within a single gesture). We categorized experts into three groups on the basis of gesture complexity: those who produced gestures representing 3 or more abacus moves at once on both tasks (solving and explaining), on only one task, or on neither task. We also assessed MA ability using an adaptive MA task, and compared performance on a matched motor interference task to generate a motor interference effect for each participant (average difficulty achieved on the motor interference task divided by the same measure on the baseline task).

The results showed little variability in the informational content of MA gestures, but experts varied in complexity: how often they produced motor chunks in their gestures. The level of complexity did not significantly predict participants' performance on the baseline task. However, a linear regression model revealed that the magnitude of the participants' motor interference effect was predicted by the complexity of their gestures: the more tasks on which participants “chunked” multiple-moves in gestures, the more they suffered under motor interference ($\beta = 0.09$, $t = 2.12$, $p = .039$). In a separate dataset with newly trained adult abacus users, we found a remarkably similar relationship between gesture complexity and motor interference. These findings suggest that representing multiple movements within a single motor representation may be a key way that gesture can facilitate MA problem solving.



Can we identify the relationship between gesture and language development at earlier ages with the help of looking while listening task?

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The relationship between language and gesture is widely investigated and it has been accepted that gestures play an integral role in the development of language (Mayberry & Nicoladis, 2000). Many studies demonstrated that gestures precede language and gesture production levels of children at early ages predict their later language proficiency (Iverson & Goldin-Meadow, 2005). For example, it has been found that gesture production at 18 months predicts vocabulary size and sentence complexity of children at 42 months (Rowe & Goldin-Meadow, 2009). Even though the predictor feature of gestures and the relationship between language and gesture development for later ages is a well-established finding, this relationship has not been identified for earlier ages. For example, it has been found that pointing levels of infants at 8, 10 and 12 months do not predict infants' vocabulary production and comprehension levels measured by MacArthur Communicative Development Inventory (MCDI) (Altınok, 2014). The reason behind this lack of findings is that the researchers use either language production or parental report language comprehension measurement tools instead of using direct measurement of language comprehension tools. Since infants produce words in their early ages and parents underestimate vocabulary comprehension of infants, we propose that to identify the relationship between gesture and language development, we should use direct measurement tools like preferential looking tasks (Houston-Price *et al.*, 2007).

In the present study, we investigated the relationship between gesture production and comprehension levels of 18 infants from 8 to 14-month of age and their language comprehension levels with both MacArthur CDI and looking while listening task (LWL) at 14-months of age (Fernald *et al.*, 2008). Infants' pointing levels were measured via the decorated room paradigm (Liszkowski *et al.*, 2012) and point comprehension levels were assessed via a point comprehension task (Behne *et al.*, 2012). The findings demonstrated that LWL scores are more strongly correlated with gesture production of infants at all months from 8 to 14-month and the average gesture production scores of each infant are significantly correlated with LWL scores ($r^2 = .54, p < .05$) whereas they are not significantly correlated with MacArthur CDI scores ($r^2 = .19, p > .05$). Moreover, there is a significant difference between LWL scores of infants (not with MCDI scores) who can comprehend the point at 12-month ($M = 19.17, SD = 16.52$) and infants who cannot comprehend at this age ($M = -16.72, SD = 22.88$), $F(1, 13) = 12.13, p < .05$.

These results suggest that direct assessment tools of language comprehension of infants might be more reliable, and predictor of infants' gesture production and comprehension levels compared to parental report language comprehension scales. These results may direct future gesture and language researches.

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DynAVis: Visualizing static multimodal annotations in a dynamic virtual environment

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Despite the many advantages of using annotation tools (e.g. ELAN (Brugman & Russel 2004); ANVIL (Kipp 2012)) to code gesture, gaze, and other body movements from video data, there are limitations in the way the annotated data is visualized by the annotator-researcher. Data points are statically presented on a timeline, with multiple tracks dedicated to the various study participants and theoretical categories. Researchers draw conclusions from visualizing multiple annotations, a complex task depending on the number of co-occurring elements they must track. Moreover, annotation software display temporally aligned segments with textual information on timelines separate from the video elements. User-analysts are forced to pause the video to read what annotations are currently active. From a user perspective, interpreting temporally related annotations and interactions is time consuming, and identifying patterns that develop over longer stretches of time is complicated, since one cannot watch the events unfold in the video and simultaneously follow the annotations.

To make the visualization of annotated body-movement data less static and more contextualized, we developed DynAVis (Dynamic Annotation Visualizer). A prototype of this tool was previously presented in (Skubisz, Evola, Ribeiro & Anjos 2016), where a proof-of-concept was developed to visualize annotated video data from a concrete case study (Skubisz, Evola, Ribeiro & Anjos 2016). This software, developed in Unity3D, allows researchers to recreate any video-based scene as a virtual environment, with avatars and relevant objects. Annotations exported as a CSV file (e.g. from ELAN) are computed by the system so that the avatars' body parts visually and dynamically represent the annotated actions in time through various visual effects. This schematic visualization of the scene compared to the raw video data eliminates “visual noise”, thus foregrounding focal aspects of the research question.

Developments in DynAVis include customizing the modeled scenes via drag-and-drop of avatars and objects, and a new user-friendly configuration tool allowing researchers to map personalized annotation schemes onto the system. Researchers can also define visual cues for advanced search results, and add bookmarks and other higher-level annotations which can be exported for use in the original annotation software. As a computational model of annotations, interactive graphics and visual statistics are available, providing a more straightforward understanding of different phenomena, but also contributing to the reduction of incoherencies between human raters, and thus to higher values of inter-rater agreement and data reliability.

We aim to provide researchers treating formal and contextualized aspects of the body in motion an easy-to-setup way of visualizing their annotated data, which will be presented through examples using gaze data and data of formal body movements. Moreover, DynAVis intends to offer an alternative way of visualizing annotated data of the (dynamic by nature) body in social interactions, thus promoting alternative ways of reasoning about quali-quantitative research questions (see Tversky 2011).

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Gesture, listening practice, and vertical spatial operation

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Macedonia *et al.* (2011) suggested the significant effect of the simultaneous use of iconic gesture and listening practice on learning artificial words. Nonetheless, they did not examine whether teaching iconic gesture and listening practice together facilitate learning artificial words more than either treatment alone. Additionally, Macedonia *et al.* (2011) did not assess to what extent these two techniques can help participants maintain knowledge of artificial words. These two issues noted above remain unclear to date.

L2 researchers published only a few studies regarding spatial language, despite growing interest in the challenges faced by L2 students in learning spatial language (Celce-Murcia *et al.*, 1999; Coventry *et al.*, 2012; Pavlenko, 2014). Moreover, there have been a very few experimental gesture studies in FL, which examine an effect of (co)-speech gestures (Kelly, *et al.*, 2009). Therefore, I was motivated to examine the two issues explained above by using spatial language with quantitative methods.

Hypotheses in this study are (1) Teaching iconic co-speech co-thought gesture (ICSCTG) facilitates learning how to express vertical spatial relationships in English for Japanese EFL high school students with a prepositional phrase. (2) Teaching ICSCTG and listening practice together facilitate learning how to express vertical operations in English for Japanese EFL high school students more than either treatment alone. (3) Teaching ICSCTG and listening practice concurrently help Japanese EFL students maintain knowledge of how to express vertical spatial relationships in English in the Japanese EFL class.

The participants were 126 Japanese EFL high school students who were divided into four groups (control, gesture only, listening alone, and gesture with listening practice). I measured correct prepositional phrases in participants' oral speech tests, including pre-, post-, and delayed post-tests. I created gestures which show vertical spatial relationships by using prepositional phrases, including *on*, *over*, *above*, and *under* to have gesture groups regenerate the gestures while they were expressing vertical axis operations.

The result suggests that a significant effect of the concurrent use of ICSCTG and listening practice, which supports Hypothesis 2 between a post- and delayed post-oral test setting [$p < .001$, $F(3, 118) = 7.205$, Partial $\eta^2 = .155$]. Hypothesis 3 was also supported between the post- and delayed post-test as well [$p < .001$, $F(1, 31) = 18.086$, Partial $\eta^2 = .368$]. Additionally, the outcome of this study supported prior studies. That is, gestures influence learning.

I conclude from results that teaching ICSCTG and listening practice together helped Japanese EFL students learn about how to express a vertical axis structure more than either treatment alone. I also conclude that teaching ICSCTG and listening practice concurrently assisted them with not only maintaining knowledge of how to express a vertical spatial relationship, but accelerated knowledge of it in Japanese EFL class.

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The role of gestures in the perception of boundaries in speech

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We investigate the use of verbal and gestural information in the perception of boundaries in video extracts of spontaneous speech. Studies on various articulators (Barkhuysen *et al.* 2008; De Kok *et al.* 2009) suggest that some gestural cues play a role in the linear segmentation of various units in discourse. The hand gestures produced in co-occurrence with subordinate structures in speech have for instance been shown to differ depending on the syntactic type of subordination, in terms of forms, directions, and/or coordinates (Enfield 2009; Streeck 2009; Frederiksen 2016). Gesture production has also more generally been shown to be coupled with syntactic packaging choices (e.g. Kita *et al.* 2007).

22 naïve participants had to measure boundary strength for 32 video extracts on a 5-point scale (“no boundary”, “uncertain”, “weak boundary”, “boundary”, “strong boundary”). The stimuli were extracted from a collection of dialogues in British English. They all contained two tone-units, the latter being a syntactic subordinate construction (mean length: 4 seconds). From a prosodic point of view, the extracts do not feature any kind of vocal break (e.g. pause, pitch reset), and have been validated as such in a prosodic perception test. The syntactic type of subordination was established as a variable, since appositive clauses are traditionally described as syntactically “detached” (De Vries 2006) while restrictive relative clauses are “attached” (*ibid.*). The hand gestures produced during the two tone-units were also established as a variable, and were subject to manipulation. Our stimuli feature 1) extracts with one gesture produced in overlap between the two tone-units (supposedly conveying continuity in discourse; Enfield 2009), 2) extracts with two identical successive gestures (supposedly participating in cohesion through form, space, and direction; McNeill & Levy 1993; Lascarides & Stone 2009) separated with a return to rest position, 3) extracts with two different successive hand gestures in terms of form, space, and direction (supposedly creating a boundary; Calbris 2011), separated with a return to rest position.

Our test aims at confirming that 1) speech boundaries between tone-units can be visually perceived by naïve participants; 2) stronger boundaries are perceived in stimuli containing two different hand gestures in terms of form, trajectory, and space; 3) stronger boundaries are perceived in stimuli containing appositive clauses.

Results show that naïve participants can identify different degrees of break in short speech extracts. Our data also shows that the production of two different hand gesture units is the strongest predictor for boundary perception. However, the syntactic type of subordination does not play any significant role in the identification of boundaries in speech.

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Gesture and sign on common ground: the social functions of manual and gaze behavior in older Belgian French (BF) speakers and Belgian French Sign Language (LSFB) signers' interactions.

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This presentation lies at the gesture-sign interface. It focuses on the interactional dimension and relevance of addressing manual and gaze practices in the context of signed interaction and how these mechanisms compare to those in spoken interaction.

Languages, including sign languages (SLs), do not only enable people to express utterance meaning but also to interact. Social interaction is the primary site for language use, or as Schegloff once pointed out: “its home habitat” (1996). Co-participants in dialogues organize their conduct through a wide array of meaningful resources, including hand movements such as palm-ups, pointing gestures, holds, (self-) adaptors and gaze shifts. Some of these have been recognized as interactive means to regulate turn-taking, express common ground or even seek responses from the addressee, revealing the importance of social processes in language use (Bavelas *et al.* 2008). Similarly, signers also perform gesture (Engberg-Pedersen 2002; Sandler 2009; Vermeerbergen & Demey 2007). However, interactional components in SL conversation (Cibulka 2016) and how they occur in the non-pathological aging process (Thornton & Light 2006) are still unexplored.

The main question is to what extent such comparison can shed new light on the understanding of the gesture-sign paradigm (Goldin-Meadow & Brentari 2017). Rather than treating them as opposite entities, this study argues for an integration of sign and gesture as part of a continuum on the interactive level. Using ELAN, annotations and analyses of palm-ups, pointing gestures, holds, (self-) adaptors and gaze in approximately 20 minutes of multimodal data of two older women (75 y. old and more) (CorpAGEst corpus, Bolly & Boutet fothc.) (task: milestones in aging) and two older men (66 y. old and more) (LSFB corpus, Meurant 2015) (task: explanation of a past memory) were conducted. Moreover, the same protocol of the LSFB corpus was replicated on four hearing participants, constituting the first multimodal cross-linguistic study between LSFB and Belgian French (BF). Two participants were also analyzed.

Pilot analyses reveal that, both, speakers and signers, can use a wide range of forms to regulate their exchange. The analyses shift focus from considering the manual channel as purely linguistic in SL interaction and as nonlinguistic in spoken interaction. Such conception has implications for the idea of sense making. It challenges the common view that meaning is only conceptual and propositional.

Ultimately, the benefits are multifaceted: (1) foster scientific exchanges between SL and gesture researchers, and shed new light on previously neglected aspects in gesture, SL and aging, (2) understand more about the language faculty in its multimodal aspect, (3) achieve a better understanding of the interactive world of BF speakers and signers in their late life, an issue with vital implications for today's increasing aging population.

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Timing matters: Gestures preceding or occurring with speech facilitate math learning

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The gestures that children see and produce can help them learn (Singer & Goldin-Meadow 2005, Cook & Goldin-Meadow 2006, Novack *et al.* 2014, Koumoutsakis *et al.* 2016). Furthermore, in math instruction, the timing of speech and gesture matters: children who receive gesture and speech simultaneously are more likely to learn than children receiving speech followed by gesture (Congdon *et al.* 2017). This study further examines the role of timing in math instruction by asking, what is the effect on learning when gesture precedes speech?

We developed a computer-based pretest-training-posttest task to test children's understanding of the equal sign in problems like $7+3+5=_+5$. Children saw videotaped lessons that provided two different strategies for correctly solving the problem: **1**) "Equalizer", which explains the meaning of the equal sign, and **2**) "Add-Subtract", which explains how to manipulate the terms in the equation to calculate the answer. The pretest/posttest contained problems that either matched the training problems ("**trained**"), or tested children's abilities to generalize to closely related problem types ("**near-transfer**" and "**far-transfer**"). During training, children alternated between watching videotaped lessons and solving additional training problems on their own.

The training lessons manipulated the order of the two instructional strategies and whether the second strategy was provided in speech or gesture, yielding four training conditions: speech *with* gesture (**S1+G2**), speech *followed by* gesture (**S1>G2**), *gesture followed by* speech (**G2>S1**), and speech followed by *more speech* (**S1>S2**). In all "G2" conditions, the gestured version of the Add-Subtract strategy involved pointing to the terms on the left side of the equation (Figure 1), making a swiping motion over the term on the right, and pointing to the blank.

We report initial results from 18 children aged 7-10. Data collection is ongoing. These initial results indicate that children learn more when gesture precedes or co-occurs with speech (**G2>S1** or **S1+G2**) than when gesture follows speech or is absent (**S1>G2** or **S1>S2**), as measured by the proportion problems solved correctly at posttest (Figure 2). Moreover, only children in the conditions in which gesture preceded or co-occurred with speech learned how to solve the trained or transfer problems; here "learning" was defined as correctly answering all problems of a given type at posttest (Figure 3).

These results suggest that gesture can be uncoupled from speech, and continue to benefit student learners, but only when it precedes spoken instruction. Our findings suggest that as input to the learner, the integration of implicit information in gesture with explicit information in speech information is more complicated than previously thought. Gesture's role in communication may include scaffolding the processing of spoken instruction when it precedes as well as occurs simultaneously with speech.



The role of action and gesture in supporting young children's mental transformation skill

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There is increasing evidence that spatial thinking is an important predictor of achievement in the STEM disciplines. Such findings raise important questions about how we can effectively support the development of spatial thinking. We examined the effects of three different training conditions, all of which involve the motor system, on kindergarteners' mental transformation skill. We focused on three main questions. First, we asked whether training that involves making a motor movement that is relevant to the mental transformation – either concretely through action (Action Training), or more abstractly through gestural movements that represent the action (Move-Gesture Training) – resulted in greater gains than training using motor movements irrelevant to the mental transformation (Point-Gesture Training). We tested children prior to training, immediately after training (posttest) and one week after training (retest), and found greater improvement in mental transformation skill in both the Action and Move-Gesture training conditions than in the Point-Gesture condition, at both posttest and retest. Second, we asked whether the total gain made by retest differed depending on the abstractness of the movement-relevant training (Action versus Move-Gesture), and found that it did *not*. Finally, we asked whether the time course of improvement differed for the two movement-relevant conditions, and found that it *did*—gains in the Action condition were realized immediately at posttest, with no further gains at retest; gains in the Move-Gesture condition were realized throughout, with comparable gains from pretest-to-posttest and from posttest-to-retest. Training that involves movement, whether concrete or abstract, can thus benefit children's mental transformation skill. However, the benefits unfold differently over time – the benefits of concrete training unfold immediately after training (online learning); the benefits of more abstract training unfold in equal steps immediately after training (online learning) and during the intervening week with no additional training (offline learning). We discuss possible mechanisms for these timing differences as well as the possibility that gesture training might out-strip action training with longer time spans between training and test.



Co-speech gestures in L1 and L2 narratives: The role of proficiency, cognitive loads and cross-linguistic influence

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This study investigates the extent to which co-speech gestures differ between Mandarin Chinese as L1 and English as L2 narratives among speakers of different L2 proficiency levels, and further examines the role language competency, cognitive loads, and cross-linguistic transfer plays in gesture production. To this end, 40 Taiwanese learners of English of two different proficiency levels (i.e. CEFR B1 and C1) were recruited, and each participant was shown a cartoon first and required to retell the story once in L1 and once in L2. The data analysis first focuses on co-gesture speech, using a corpus linguistic approach to analyze the extent to which participants preferred to “gesture” particular semantic and part-of-speech categories of information in their speaking in L1 and L2. The study then explores co-speech gestures, investigating the extent to which co-speech gesture (beats, iconic gestures, deictic and metaphoric gestures) differ between L1 and L2 among speakers at different L2 proficiency levels. Furthermore, in order to obtain a more robust understanding of linguistic-gesture representation from cognitive perspectives, based on Thinking for Speaking Hypothesis (Slobin, 1987) and Information Packaging Hypothesis (Kita, 2000) this study investigates motion expressions in L1 and L2 narrations with the following aims: 1) to see if there is L1 transfer on gestural encodings of motion in L2 narrations and what gesture types are more likely to be transferred than others, 2) to examine the extent to which participants use more representational gestures in their L2 than in L1, and lastly 3) to test if enhancing cognitive loads makes L2 learners produce significantly more gestures in their L2, and the extent to which cognitive loads correlate with cross-linguistic transfer. The examination of the co-occurrence of speech and gesture is expected to provide a key insight into second language cognition and the interplay between the two models of communication.



Gesture repetitions in political-religious speeches: A multimodal analysis

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We aim to analyse gestural repetition in the political-religious speech of “Evangelical Bench” (*Frente Parlamentar Evangélica*) members, a parliamentary group that defends the interests of evangelical churches in the House of Representatives in Brazil. We also aim to investigate how the gestural repetition may be used by these subjects to specify the meaning of something said verbally (Kendon, 2004). Our data analysis consists of three-minute excerpts of videos of three different so-called deputy-preachers Eduardo Cunha, Marco Feliciano and Silas Malafaia, collected from Legislative Sessions available at The House of Representatives website. To analyse the data, we have worked with the professional software ELAN (Sloetdjes; Wittenburg, 2008) using the following categories based on the Linguistic Annotation System for Gesture (Bressem, 2013) to describe the gestures: handshape, palm orientation, movement direction and quality, and position in space. After isolating the strokes, we added some classifications to the analysis, in order to establish an interrelation between gesture and speech: Gesture Iconic Representation, which represents the gesture iconic description, such as: “pointing”, “punching”, “setting boundaries” etc. Reference, which is related to the concrete or abstract referent vehiculated on the speech, and Pragmatic Reference, which also concerns the speech that co-occurs with the described gestures, in terms more general pragmatic terms, such as: topic, comment, previous referent, new referent or specific word. From a theoretical-methodological point of view, we explored the categorization of gestural repetitions “iteration” and “reduplication” (Bressem, 2013). We assume that, in the analyzed political-religious discourse, there is gestural repetition, more specifically, more occurrences of gestural iterations, when the repetition is used to vehiculate the same meaning, and some reduplications, when the repetition of gestures occur in order to create a complex meaning (Bressem, 2013). Results has shown that there is a gestural similarity between the analysed subjects since there are more occurrences of repetition, or of the same strokes, made more than once in a single sequence, than different strokes in which there are more than one movement pattern made at a single sequence. We used the preparation and resting positions to determine each analyzed sequence, considered as one complex stroke, containing one or more than one movement pattern. Furthermore, we concluded that in the political-religious discursive domain, there is a higher incidence of pointing gestures that are used to reinforce the indoctrinating nature of the political discourse conveyed by religious leaders.

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Sign language experience affects comprehension and attention to co-speech gesture

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We rely on co-speech gesture for comprehension, especially when it conveys information that is different from speech. However, not much is known about how language experience affects people's attention to gesture. Exposure to a sign language could shape how one uses gesture which is also in the manual modality but, unlike sign, is non-linguistic. We ask whether language experience shapes signers' and speakers' attention and comprehension of gesture.

In a within-subjects design, deaf signing ($n = 12$) and hearing participants ($n = 30$) watched short narratives of a woman telling a story in four different conditions: *Gesture+Speech without Sound*, *Gesture+Speech with Sound*, *No Gesture+Speech without Sound*, and *No Gesture+Speech with Sound*. In the *Gesture* conditions, the narrator produces iconic co-speech gesture as she speaks. In the *No Gesture* conditions, the narrator does not move her hands as she speaks. Using eyetracking technology, we recorded their gaze patterns to the narratives, and focused our analyses on the following areas: Face, Mouth and Gesture Space. Additionally, we tested their comprehension of the narrative following each video. Subjects did a forced choice task, choosing between two cartoon vignettes that best matched the narrative. Half the trials were *Easy* and half were *Hard* (Fig. 2).

We first analyzed signers' and speakers' attention patterns to the narratives. Across conditions, speakers spent significantly less time looking to the Face than signers ($\beta = -0.17$, $p < 0.001$), but looked more to the Gesture Space than signers ($\beta = 0.18$, $p < 0.001$; Fig. 3). For comprehension, as predicted, speakers outperformed signers in both *Sound* conditions because they had access to speech ($\beta = .26$, $p < 0.01$ for G+S; $\beta = .52$, $p < 0.001$ for NG+S; Fig. 4). Then, we focused on our analyses on the *G+S without Sound*. If signers and speakers use gesture differently, that difference should manifest itself in this condition. There were no group differences in comprehension when *Easy* and *Hard* trials were collapsed; however, for the *Hard* trials signers performed marginally better than speakers ($t(24) = -1.36$, $p = .09$). To explore this further, we looked at the proportion of subjects who got 100% correct on task and found that 67% of the signers, compared to 48% of the speakers, were at ceiling.

Signers and speakers exhibit distinct attention patterns to gesture. Further, signers seem to be better at understanding gesture. Even though signers use gesture for comprehension, they spend significantly less time attending to gesture compared to speakers. Direct attention to gesture does not necessarily inform us about how they process gesture. Future work will investigate how different language experience affects gesture comprehension and how these early attention patterns to gesture emerge in development.



Different word learning contexts modulate the learnability of iconic signs

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Iconicity can help with language learning, i.e., mapping a specific word-form onto its referent, allowing language learners to learn more quickly [1-3]. Thus, iconicity in both signed and spoken languages may serve as an important mechanism for language acquisition. However, iconicity could lead to ambiguity in certain learning contexts, such as having to map phonologically similar words onto similar referents. For example, a sign with open hands ('5' handshape) tapping the sides of the head could refer to any animals with antlers. While such a sign is highly iconic, it can be ambiguous in situations where similar-looking animals need to be discriminated.

We ask whether iconic sign learning is uniform across all scenarios, or are there conditions where learning iconic signs may be disadvantaged? We created a sign-learning experiment using a cross-situational learning paradigm [4], which simulates natural language learning. Cross-situational learning is statistical, which, instead of exposing learners to single word-referent correspondences, provides multiple referents across time with only one referent occurring systematically with a given word. Four learning environments were manipulated such that:

- 1) **Unrelated:** signs were presented in unique environments in which they iconically mapped onto one referent
- 2) **Same animal and same phonological class:** the sign could map onto either referent
- 3) **Same phonological:** many signs had a similar phonological form (e.g., all sharing the place of articulation)
- 4) **Same animal:** signs that had unique phonological forms but were semantically similar (Fig. 1).

We tested hearing non-signers ($n = 42$), and found a significant main effect of iconicity: participants were more accurate in identifying iconic over arbitrary signs regardless of learning environment ($F(1, 42)=270.63, p<.0005$). There was also a significant effect of Block, where subjects performed better over time both for accuracy and reaction time ($F(2, 84)=48.13, p<.0005, \text{Fig. 2}$). Then, we asked whether there was an effect of learning environment on learning iconic signs. When the referents belonged to the *Same phonological and same animal class*, learners were the least accurate and slowest. Also, learners were less accurate and slower at learning signs that were more phonologically similar (i.e., both signs at the same place of articulation), but not when signs were semantically similar (i.e., both signs referring to two similar objects; Fig. 3-4).

Phonological similarity more than categorical similarity between referents was the most detrimental for learning iconic signs. Where there are many signs that are similar, referring to similar objects, arbitrary signs may improve learning. Arbitrariness allows distinct signs for each object, which makes it easier to distinguish between them for learning. Our findings provide a possible explanation for how our lexicons today have become characterized by mostly arbitrary words.

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Intra-individual differences in iconic gesture use in children's narratives

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Some children gesture a great deal, others hardly at all. The present study examines variability in gesture rate during storytelling *within* a child in a group that demonstrates typical variability across children. Iconic gesture use changes with developing linguistic skill; previous studies reported wide variation across children: the standard deviation for gesture rate is often larger than the mean gesture rate itself.

Thirty children aged 8 to 11 retold two fictional stories (F1, F2) and a number of autobiographical stories (median = 3). In total, 170 stories were collected (autobiographical = 116, fictional = 54). Gesture rate varied widely across children (overall $M = 2.5$ gestures/100 words, $SD = 3.2$, min = 0.0, max = 14.6). Gesture rate was strongly correlated with story length ($r_s = 0.68$, $p < .001$) and story complexity ($r_s = 0.75$, $p < .001$). Fictional stories were longer ($M = 231.9$ words, $SD = 158.0$) than autobiographical stories ($M = 79.3$ words, $SD = 55.2$). Fictional responses were more likely to include descriptions of goals and obstacles (33/54, 61%) making them more complex than autobiographical responses (16/116, 14%). Autobiographical responses were more likely to be a simple answer with no temporal or causal links (59/116, 51%) compared to fictional responses (1/54, 2%).

To assess stability of a child's rate of gesture production, we chose F1 as a benchmark for comparison with the second fictional story and the autobiographical stories. Children's gesture production in F1 was assigned to one of 3 categories to create roughly split thirds: none (0 gest/100 words, $n = 9$), lo (< 5 gest/100 words, $n = 11$) or hi (>5 gest/100 words, $n = 9$). Using kappa, we compared gesture category for fictional stories (F1 vs. F2, $\kappa = .54$, $\kappa_{\max} = .65$) as well as the autobiographical stories (F1 vs. Auto, $\kappa = .26$, $\kappa_{\max} = .45$). The scores suggest children's instability in gesture rate between fictional stories, and greater instability between F1 and the various autobiographical stories.

Figure 1 shows the gesture rate of all stories by the child's F1 gesture category. Children with high gesture rates produce stories in all categories, but children with no gestures in F1 produced only two responses with a high gesture rate. We conclude that children who gesture show substantial inter- **and** intra-individual differences in gesture rate across narratives, whereas children who did not gesture in F1, were more consistent in their (lack of) gesture production. Examining multiple responses across children provides the opportunity to determine situational factors that influence gesture production. We discuss possible reasons for these intra-individual differences, including the degree of visuo-spatial and action-related content of the stories.

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Multimodal adaptation to pragmatic constraints in a complex language task: A developmental investigation

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The main goal of this paper is to employ a developmental perspective in the empirical study of a multi-focus production task. The task was a finalized procedural explanation in the context of a collaborative game. We sought to study how and when children start to master both referential and pragmatic constraints of language production.

Children gradually learn to adapt their linguistic choices (Berman, 2004, 2005; Mazur-Palandre, 2015) and gestural behavior (Colletta, 2004; Colletta *et al.*, 2009; Mazur-Palandre and Lund, 2016) according to the language task and the context of production. In a study on oral explanation (Authors), pragmatic constraints of two distinct types of explanatory interactions were found to impact both the organization of syntactic elements in clauses and the gestural behaviour in children's oral explanations. Children were confronted with either a dual-goal task including both a referential issue and a social interactional issue (e.g., an instructional explanation addressed to a novice peer) or a single referential task (e.g. a procedural explanation addressed to a non-novice participant). Results showed that children aged six years verbalized more new information markers and modal structures and produced more pragmatic gestures in the dual-goal task than children engaged in a single referential task. Yet children in both tasks failed in checking for their addressee's comprehension and in actively contributing to the interaction process, leading us to focus on how this competence develops. Indeed, the ways in which older children develop interactional competence in complex dual-type language tasks—including a joint achievement through the monitoring of social interaction—remains largely unstudied.

In the data we gathered, children aged 9 to 13 years and belonging to four age groups: 3rd graders, 4th graders, 5th graders and 7th graders were asked to explain an unfamiliar collaborative strategic game (Hanabi) to three of their classmates after training and playing the game once. All participants were filmed and recorded; linguistic and gestural data were transcribed and coded with the software ELAN.

In this study, we report on three predictions regarding children's gestures and linguistic choices, each increasing in specificity. First, a child's age will affect both lexical content and information quality. Second, no matter what their age, children rely on gesture for their communication, but the reasons for which they rely on gesture change as they develop. For example, and third, younger children use representational gestures in order to help formulate the informational content of gestures whereas older children add gesture information they think is relevant for helping the listener to understand. These results are the first of a more complete analysis aimed at tracking and better understanding the evolution of such interactional pragmatic abilities.



Realistically animating proforms involving placement and movement in Sign Languages

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Portraying sign languages via an avatar is an essential component for noninvasive technologies whose goal is better Deaf-hearing communication. The legibility of an avatar's signing hinges on the naturalness of its motion. Achieving natural motion requires a linguistic system to structure communication content and a mathematical system to animate it. Without each the effort fails, and the result is robotic motion that is difficult to read.

Proforms in sign language are gestural units which consist of a handshape whose linguistic function is to reference an entity generally signed prior to the proform (i.e. Engberg-Pedersen *et al* 1985, Sutton-Spence *et al* 1999). Proforms are extensively used in depicting structures to express placement and movement of entities or spatial relationships among entities. For example, in French Sign Language (LSF), the sign CAR has a related proform with a horizontal flat handshape to show the location and orientation of the car and the car's movement in signing space. In American Sign Language (ASL), the same is accomplished with a '3' handshape. To communicate such constructs legibly, the avatar's motion must be natural, and previous attempts have fallen short in this regard (Kacorri *et al* 2013).

Synthesizing proforms is challenging because they are among the least lexical constructs in sign languages, exploiting both gesture and semantic structures as the signer depicts a scene in space (Morgan-Woll 2007). The descriptive and productive nature of proforms precludes the use of pre-recorded or captured animations. Any effective solution must strike a balance between pre-recorded motion, which limits flexibility, and linguistically driven generation, which results in unnatural poses and robotic motion.

This presentation will describe a novel method for synthesizing proforms that builds on prior avatar and linguistic systems, and which allows the avatar system the freedom to choose natural postures and motions. This freedom arises from the fact that proforms are under-specified geometrically (Filhol, *et al.* 2006), leaving open a range of degrees of freedom in placement and movement. The method allows the linguistic system to specify placement and motion by linguistic category, e.g. the straight or ballistic motions of (Liddell & Johnson 2011). An example for a straight movement can be found at <http://asl.cs.depaul.edu/proforms/moveperson.mp4>. The new method achieves this naturalness via a system of non-linear motion controllers that can be tuned to linguistic styles. It produces natural proform placement and motion that can provide a test-bed for linguistic theory and a powerful tool for linguistic modeling and experimentation. The presentation will detail the linguistic descriptions and the mathematical models that comprise the method, and will demonstrate how the method exploits under-specification to choose postures and movement that communicate proforms legibly and flexibly.

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Shifting thinking-for-speaking patterns in the Spanish second language classroom: A mindful conceptual engagement approach to teaching deictic verbs

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Spanish verbs such as *ir/venir* (go/come) and *llevar/traer* (take/bring) show a different deictic pattern that differs from the English equivalent: While English takes the listeners' perspective and uses a verb such as 'come' for movement that is away from the speaker, Spanish speakers follow their own perspective: *ir* (or *llevar*) for movement away from self, *venir* (or *traer*) for movement toward self. This subtle semantic difference between these two sets of deictic verbs presents a challenge to English speakers learning Spanish, even at advanced levels.

Our study connects with recent research on deixis, linguistic relativity, and thinking-for-speaking (TFS) patterns (Slobin, 1996) in the field of L2 acquisition (Han & Cadierno, 2010), in relation to motion events and deixis (Hijazo-Gascón, 2017). We argue that a Mindful Conceptual Engagement (MCE) approach (Negueruela Azarola, 2013) constitutes an appropriate L2 pedagogy for promoting conceptual internalization. We propose that the key to shifting L1 TFS patterns is engaging L2 learners in pedagogical tasks that promote intentional and conscious conceptual manipulation. These required both the development of pedagogical materials for the teaching of deictic verbs and active engagement by learners, such as the creation and manipulation of their own conceptual representations as a learning tool to understand deixis.

In this work, we particularly focus on the L2 learners' usage of deictic and iconic gestures (Gullberg & McCafferty, 2008; McCafferty & Stam, 2008; Stam, 2006) when using deictic verbs. By focusing on the learners' gestures, before, during, and after the proposed pedagogical application from a conceptual perspective, we seek to address two research questions: (1) does this pedagogy facilitate learners' awareness and internalization of the above-mentioned typologically different semantic patterns? and (2) does a shift on their gesture patterns occur as a result? Coded data and examples of graphic representations will be presented.

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Points of comparison: What pointing gestures tell us about the origins of signs in San Juan Quiahije Chatino Sign Language

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New languages emerge under rare conditions, when deaf children who cannot access the vocal-auditory language(s) used around them invent visual-manual communication systems of their own. Such *homesign* or *family sign* systems have simple structures but nevertheless show the hallmarks of language, including a stable lexicon of signs composed of meaningful, recombinable elements [1], [2].

Prior research has found that many of the components of home/family signers' morphology are invented by signers, and has suggested that few such components are adapted from the gestural input received from hearing interlocutors [3].

Notably, pointing—a foundational element of face-to-face interaction—has not been studied as a potential source of morphology for home or family sign languages. This may result from the assumption that pointing gestures are *gesticulations*: holistic, non-composite signals, lacking in the requisite structure to serve as a morphological model [4], [5]. However, much of the literature documenting pointing practices suggests that the opposite is true; i.e., that indicating gestures have an internal structure, with discrete formational components mapped to distinct meanings [6] [7] [8] [9].

The current study returns to these these conflicting claims, examining pointing gestures for evidence of internal structure and considering whether such structure might be incorporated into the pointing morphology of a sign language emerging in a rural, indigenous community in Mexico: San Juan Quahije Chatino Sign Language (SJQCSL).

Two studies were performed in the San Juan Quiahije municipality of Oaxaca, Mexico to investigate these questions. In the first, the spontaneous, speech-linked pointing gestures of non-signing hearing people, produced in 'local environment interviews' [10] were examined for internal structure. Participants' pointing gestures in 6.5 hours of video data were found to comprise three meaning-linked formal elements: handshape, direction, and elbow height. Systematic modulations in the form of these elements reliably convey information not only about the direction of the pointing target, but also about its distance from the gesturer (Fig. 1).

A second study compared the forms and meanings of two deaf SJQCSL signers' pointing gestures with those of the hearing participants. Signers' pointing behaviors in 40 minutes of video data (comprising interviews and spontaneous signing) were found to exhibit the direction and elbow height features, but not the handshape features, of the conventional pointing system (Fig. 2).

These findings reveal that indicating gestures exhibit an internal structure that can be incorporated into an emerging signed language. They also reveal that not all features of gestures—even ones that exhibit clear patterning—will be adopted by signers, perhaps because



gesture features must be both systematically patterned and transparently visually meaningful for signers to interpret them as meaningful.

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Habits of feeling, action, and thought: A Peircean account of regularities in gesture

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Previous gesture research has integrated Peirce's sign-object relations *icon*, *index*, *symbol* into various typologies and foci of analysis (e.g., Andrén 2010; Mittelberg 2006; Fricke 2007; McNeill 1992). This paper shifts the focus to Peirce's (1960) more fundamental *Universal Categories* (henceforth UCs) – *Firstness*, *Secondness* and *Thirdness*. Peirce established a set of trichotomies based on the three elements any semiotic process involves: the *sign* itself, the sign in relation to its *object*, and the sign in relation to its *interpretant*. For each triad, Peirce (1998) systematically described the relata as a *first*, *second* and *third*, assuming Firstness (possibility, potential meaning), Secondness (actuality, local meaning), and Thirdness (law, conventional meaning) to underpin, as heuristic principles, all processes of perception, imagination, reasoning, expression, and interpretation.

Applying Peirce's UCs to gesture, I first briefly lay out how Firstness may be said to predominantly draw attention to qualitative characteristics of gestural signs, Secondness to their experiential grounding and actual contextualized meaning, and Thirdness to their conventionalized facets (Mittelberg 2006). The guiding assumption here is that compared to Thirdness-laden linguistic symbols constituting written, spoken or signed discourses, spontaneous gestures may exhibit the UCs in different, modality-specific ways and to more strongly varying degrees.

The discussion then narrows in on Thirdness, i.e., the category of convention, law, habit, conceptualization, and semiosis (Peirce 1960). It is argued that Thirdness not only underpins symbolic emblems, but also resides in different kinds of embodied schemata, social practices (e.g., Bourdieu 1980; Streeck 2009), and entrenched pragmatic inferences that give rise to various regularities and thus schematicity in gesture (Mittelberg in press). Drawing on recent work on Peirce's notion of *habit* (West & Anderson 2016), I discuss – based on sequences from American-English and German multimodal data – how *habits of feeling, action and thought* (ibid.) may motivate gestures and also guide their interpretation (e.g., Wolf et al. 2017).

Overall, this paper advocates that Peirce's notion of Thirdness may encompass an array of regularities that may be observed in individual and social practices of gesture use, as well as in (micro-) processes of learning and conventionalization within a certain pragmatic or cultural context, as suggested by the work on, e.g., *recurrent gestures* (e.g., Bressemer 2014; Bressemer & Müller 2014; Ladewig 2014; Müller 2017), *gesture families* (Kendon 2004), image-schematic patterns (e.g., Mittelberg 2018; Cienki 2013), or multimodally instantiated constructions (e.g., Mittelberg 2017; Zima & Bergs 2017). This growing body of research shows how in multimodal communicative acts, habits of feeling, (inter-) action, and thought tend to jointly drive gestural forms and functions.

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Show me how you feel: Do parents' gestures promote children's understanding of mental states?

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Gestures are a critical part of both the symbolic and communicative functions of language, and have been shown to increase language comprehension and conceptualization. This study aims to show the associations between parents' gestures and change in children's receptive language development and understanding of mental states in toddlers between 12 and 30 months old. Research has shown that parents' gesture use is indirectly related to vocabulary development through children's own gestures, and that parents' representational gestures have an indirect relationship with language development. Because of the role of both parents' and children's gestures in children's receptive language development, and the role of gesture in comprehension of new concepts, we wonder whether parents' gestures support very young children's understanding of specific, nuanced mental state concepts, such as emotions. We hypothesize that the clarity and intensity of parents' representational gestures for emotions will predict children's conceptualization of emotion as seen in their abilities to provide a verbal label or gestural representation of emotions implied in a story context. We also expect that the effect of parents' gestures on children's comprehension of emotions will be partially mediated through children's receptive language skills. The sample was 174 parent-infant dyads (Chile n=103; US n=71). Children (52% boys) were assessed at around 12, 18, 24, and 30 months old; child language skills were assessed via the Bayley Scales of Infant Development at 12- and 30-months. Parents' gestural representations were assessed at the 12- and 30-month waves. Parents included both men and women, though females predominated. Researchers read stories to each dyad member separately, and after each one, asked them to label then represent the emotion associated with the protagonist in the story. For parents, responses were coded to determine which facial and bodily features and movements they used to represent emotions (e.g., cocking head, raising eyebrows, opening mouth); representation intensity scores were derived by totaling the features and movements used to make each representation. To assess children's comprehension of concepts of emotion at the 30-month wave, we counted the number of stories for which children provided a reasonable verbal or gestural label for an emotion when asked how the story character felt. Preliminary analyses show US parents represent emotions with greater intensity ($t = 2.011, p < .05$), particularly in use of body movement to represent ($t = 3.436, p < .001$). Linear regression analysis will be used to determine the influences of parents' representation intensity on children's understanding of mental states, and the role of children's receptive language in that relationship.

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Politics and Sheng: The principal catalysts of gestural diversity and dynamism in Kenya

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Humanity is full of ever changing gestural communication whose meaning is assigned by the community members as a result of linguistic, cultural, social, and spiritual influences. This varying nature, of gestures and gestural communication, is evident across several cultures, languages, societies and social groups, in that whatever gesture or sign which is acceptable in one society, is completely forbidden or taboo in another. Furthermore, meaning assigned to gesture keeps changing within the same society as time goes by, ending up with totally different over some given period due to changing contexts.

In the Kenyan society, various gestures and signs derive their changing meanings from the community due to several reasons, chief of them being the political environment and the Sheng phenomenon, which is rampant among many community members, especially the youth. An example is the use of a clenched fist and a two finger salute whose meaning has evolved habitually since the 1990s. A clenched fist was a sheng gesture for '*kobole*' or 'punch' (a five shillings coin) but the prevailing political situation in the 1990's changed its meaning to a 'DP' (Democratic Party of Kenya) salute, before its currently acquired meaning of 'Resist' due to its use by the opposition coalition (NASA) to advocate for an economic boycott of some products of companies alleged to be friendly or associated with the ruling party (Jubilee) leaders. Likewise, the two-finger salute which previously signified the opposition's clamor for multiparty politics, the change of section 2A of the Kenyan constitution, *kuchill* (a Sheng word for abstaining from sex before marriage), and *kul* (a Sheng word denoting satisfaction or being ok), has finally been associated, by some individuals, with the Illuminati.

Several other examples exist, including terminologies and signs like 'watermelon', the middle finger signal, shrugging of shoulders, 'orange', 'dreadlocks', 'tunnel', 'analogue', 'digital', *kitendawili* (riddle) *ndaani ndaani ndaani* (deeper), *baba* (father), *vijana* (youth), *kupita katicati* (passing in between), *mafisi* (hyenas), among others, whose meaning is derived from the existing political state and the sheng phenomenon. This paper therefore seeks to debunk the prevailing semiotic space in Kenya, focusing on their form, meaning, function, dynamism and diversity, resulting from politics and sheng as the principal catalysts, alongside other linguistic, cultural and social factors. It will also attempt to establish the relationship between these gestures and the spoken language in the Kenyan community.



Dominance in sales negotiations: A multimodal approach

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With this paper, we want to uncover which (combinations of) multimodal behavioural factors can predict which speaker is perceived to be the more dominant interlocutor. Research on this topic has revealed that dominance correlates with a series of behavioural features. Concerning verbal behaviour, dominant speakers typically talk more, longer, louder, introduce new content words, ask questions, elicit turns, switch conversational topics, interrupt or ignore their partner, start talking during silences, etc. (Dunbar & Abra 2010, Guerrero 2005, Nakano & Fukuhura 2012). At the non-verbal level, dominance is associated with smiling, having more relaxed or more masculine facial expressions, leaning towards or touching the partner, looking at the partner while speaking, not breaking mutual gaze, etc. (Dovidio 1985, Knapp & Hall 2010, Watkins, Jones & DeBruine 2010).

First, we annotated a subpart of an existing audio corpus (CGN, *Corpus Gesproken Nederlands*, Oostdijk 2000) and a self-compiled video corpus for a set of behavioural features. Both corpora consist of dyads of interlocutors engaged in a sales negotiation. Following the literature described above, we annotated both corpora for features including loudness, pitch, speech rhythm, part-of-speech categories, posture movements, gaze and manual gestures. Second, we presented 2-minute audio and video snippets from both corpora to a large set of raters (n=226) that had to express – on a 7-point Likert scale – to which degree they found speakers to be dominant in the conversation. In a third and final step, we coupled our annotations to the ratings to look for correlations. We used mixed effects models to test for significant effects.

In line with the existing literature, dominance is explained by a wide array of features under scrutiny, including number of utterances, word length, average pitch, number of hesitation and negation markers, gaze behaviour and postural movement. However, we found that different factors predict dominance for purchasers and dominance for sellers. The latter is best explained by average pitch (the lower, the more dominant), the amount of interruptions (the less interruptions, the more dominant), the amount of amount of negation markers (the less negations, the more dominant) and postural movement (the less dynamic, the more dominant). In contrast, and concerning the purchasers, dominance is best explained by average pitch (the higher, the more dominant), the amount and length of words (the more, the more dominant) and gaze behaviour (the less gaze aversion, the more dominant).

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Experiencing metaphors with others: The emergence of metaphorical gestures in artistic settings

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The definition of conceptual metaphor as one conceptual domain understood in terms of another is widely spread in cognitive linguistics. In order to determine these domains, a source and a target must be identified (Lakoff & Johnson, 1980). Over time, scholars have developed different methodologies like the MIP (Pragglejaz Group, 2007) or MIP-VU (Steen, *et al.*, 2010), among others, to address the presence of metaphors in text or speech. Metaphors, however, can be expressed monomodally or multimodally (Cienki, 2017a). When presented in gesture, a metaphor consists of an abstract referent that is iconically represented using one or more features of a physical entity (Cienki & Müller, 2014). For example, by moving the hand downward from left to right to express the loss of value of a country's currency (Cienki, 2017b).

Gestures are semiotic resources and speakers may use different modes of representation or depiction depending on the context (Streeck, 2008; Müller, 2014). In this sense, what happens when dancers and musicians need to “translate” to others certain body movements or emotional expressiveness of their performances? In these contexts, metaphorical gestures can convey meanings that are not necessarily present in discourse. The latter is relevant if we consider that artistic manifestations are known to articulate forms that cannot be completely expressed through language. Thus, the emergence and later conventionalization of gestures that embody abstract concepts is key to communicate these experiences to others (Langer, 1967; Stern, 2010). As Cienki & Müller (2014) point out: “The metaphor thus becomes an interactive object of a shared embodied experience manifesting itself in a web of metaphoric meaning” (p. 1174).

Following a study done by Müller & Ladewig (2013) on metaphors for sensorimotor experiences, we seek to present the dynamic qualities of metaphor in two particular settings: dance lessons and orchestra rehearsals. Using primarily qualitative tools, we looked for particular metaphors that were intended to communicate bodily feelings or musical qualities and different ways in which they were presented. As a result, we distinguished between overall topics and their modalities of presentation (Gurwitsch, 1979). Seeking to offer insights into the subjective and dynamical level of experience (Sheets-Johnstone, 2011), we analyzed the unfolding of metaphors in these settings using speech, gesture and movement in interaction. We presented every metaphor to experts within the discipline in order to determine conventionalized gestures belonging to each discipline. This comparison was crucial since metaphoricity, as a cognitive process, can be activated by the speaker and their co-participants in the flow of interaction resorting to metaphors of a varied degree of novelty. Our study contributes to the field by showing the need to develop methodologies that are capable of grasping interactive and dynamic processes of metaphorical gestures (Cienki & Müller, 2014).

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Hearing speakers' gestures influence perception of signs at first exposure but not after training: Evidence from ERPs

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Studies suggest learners exploit their gestural¹⁻⁴ repertoire during the acquisition of a sign language as second language (L2). This claim, however, is not a settled matter because gestures also have the property of iconicity - the motivated relationship between a (non)linguistic form and its referent⁵⁻⁷. As such, it is hard to determine the contribution of iconicity and gesture in people's understanding of signs at first exposure. One way to circumvent this difficulty is to investigate the effect of signs resembling people's gestures. In some instances, both manual systems represent a referent with the same iconic devices (Figure 1a), but sometimes gestures and signs, while still iconic, diverge in form to represent a concept (Figure 1b). Signs that do not align with learners' gestures may be treated as new tokens. In contrast, signs that resemble gestures may not be entirely novel forms because they can deduce their meaning based on their gesture. By looking at signs that overlap with gesture, will it be possible to understand the role of gesture at first exposure to a sign language.

In this event-related potential (ERP) sign-learning study, we investigated whether non-signers exploit their gestural repertoire at first exposure to Sign Language of the Netherlands (NGT). Signs had high overlap (HO) or low overlap (LO) with previously collected gestures from the same cultural group, while controlling for iconicity. Overlap was operationalised by the number of parameters (handshape, location, movement, orientation) shared between them. Dutch hearing non-signers took part in the study which consisted of four blocks.

- Block 1 (first exposure): exposure to 72 NGT signs (36 HO and 36 LO) paired with the Dutch word and matched for iconicity across conditions.
- Block 2 (training): participants viewed the same signs three times, and were asked to imitate them each time.
- Block 3 (second exposure): exposure to the same 72 signs.
- Block 4 (testing): the translations of the 72 signs were presented and participants had to produce the sign from memory.

Electroencephalogram (EEG) activity was recorded during Blocks 1 and 3 with 64 active electrodes. ERP's were time-locked to the onset of the video.

Preliminary analyses reveal a difference between HO and LO signs with LO eliciting more positive amplitude over frontal areas starting 300 ms after onset of the sign's meaningful handshape in Block 1. This difference was not observed in Block 3.

Non-signers perceive signs resembling their gestures as recognisable manual structures that are effortlessly processed at first exposure. In contrast, signs that do not align with their gesture show an increased processing cost. This cost disappears after increased learning. This study is the first to show at a neurophysiological level that non-signers exploit their gestural knowledge at first exposure to a sign language.

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Speakers' gestures predict the meaning and perception of iconicity in signs

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Non-signing adults show low performance when guessing the meaning of iconic signs suggesting that their iconic features are largely inaccessible¹⁻³. Also, while iconicity ratings have been used as proxy to measure understanding of a sign, it remains unclear the criteria used to assess degree of iconicity. To date, it has not yet been thoroughly investigated whether gestures, which also share the property of iconicity, may assist in making form-meaning judgements about signs. In many instances, sign and gesture converge in the way to express the same concept (e.g., signs and gestures tend to converge in the form to represent 'smoking'). As such, non-signers will be accurate at guessing the meaning of signs and give high iconicity ratings but not when they lack strong resemblance. Here we investigate if non-signers exploit their gestural repertoire to deduce the meaning of signs and make form-meaning judgements.

We report the results of a gesture elicitation task (study 1) and an open-cloze and iconicity rating task (Study 2) to evaluate the role of gesture in interpreting the meaning of signs by naïve non-signers. In Study 1, we elicited silent gestures from non-signing adults to determine which gestures were the most systematic. These were then compared to signs from Sign Language of the Netherlands (NGT) and looked for items that overlapped in form in different degrees. This resulted in three categories: Full overlap (N=36 signs), partial overlap (N=56 signs), and no overlap (N=54 signs) (Figure 1). These signs served as stimulus materials for Study 2 where a different group of participants were presented with the signs and were asked to guess their meaning and give iconicity ratings.

The proportions of correct answers were calculated for every item and iconicity ratings were averaged across participants for all concepts. Statistical analysis revealed that there was no significant difference in the proportion of correctly guessed signs with full (M= 0.61, SE= .06) and partial overlap (M= 0.46, SE= .05) but these were different from signs with no overlap (M= 0.12, SE= .03). Regarding iconicity ratings, there was no significant difference between signs with full (M= 5.92, SE= .15) and partial overlap (M= 5.34, SE= 0.17) but there was significant difference with signs with no overlap (M= 3.18, SE= 0.22).

The similarities between sign and gesture can be explained by both being limited by the same physical constraints to express a concept in the manual modality, and because deaf and hearing adults share conceptual knowledge about certain concepts. When there is sufficient overlap between signs and gesture, non-signing adults tap into these schemas to make judgements about the meaning of signs. The gestural repertoire of non-signing adults is recruited to make judgments about the meaning of signs.

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Action-speech and gesture-speech integration in younger and older adults: An event-related potential study

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In terms of lifelong learning and from a cognitive aging perspective, it is very important to search for optimal forms of information communication for older adults. In the present study, two types of multimodal communication forms, namely action-speech and gesture-speech integration, were investigated in young and older adults. Electroencephalography was used to compare mental integration of spoken text with visually perceived actions and gestures. We analyzed the N400 (incongruency effect) while participants watched video clips showing a human actor performing or pantomiming an action while they listened to a congruent or incongruent spoken action phrase. In both age groups, a more widespread scalp distribution was found for the N400 incongruency effect for action-speech combinations than for gesture-speech combinations. In younger adults, a more widespread scalp distribution was found for the N400 incongruency effect than in older adults. These findings reflect that although the brains of older adults were less responsive to incongruency between the visual and verbal information than those of younger adults, both age groups found it easier to process action-speech combinations than gesture-speech combinations.



Differential role of gestures on spatial language in patients with speech deficits and elderly adults

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Gestures can provide a good natural alternative to verbal communication both for people with speech deficits and healthy populations. For example, patients with aphasia use more gestures to compensate for their speech deficits (Sekine & Rose, 2013) and healthy adults use gestures to supplement and/or complement their speech (Melinger & Levelt, 2004). When gesture use is inhibited, the former findings suggest impairment in the verbal expression since compensation is not possible, whereas the latter suggest enhancement in the expressive power of speech. The current study aims to understand the effects of gesture restriction on speech production by comparing people with speech impairments and healthy adults to understand if gestures serve differential functions for different populations during speech production.

Six patients with left hemisphere lesions and 20 elderly controls watched 39 videos depicting different motion events with combinations of different manners (how an action was performed, e.g., *skipping*) and paths (the trajectory of a motion, e.g., *over*) in 3 conditions. They were asked to describe what the woman did in the video (1) spontaneously (SG), (2) only in speech without any gesture and (SO), (3) only in gesture without any speech (GO). The accurate use of manner and path components in speech and gesture was coded.

For analyses, we used both group-level analyses using non-parametric tests and single case statistics (Crawford & Garthwaite, 2005). Group-level analyses showed that patients were impaired in naming both manner and path compared to controls in SG and SO conditions, all $ps < .05$. When gestures were restricted (SO), controls named the path more accurately compared to SG, in which most of their gestures were referring to path, $p < .05$. Patients described the manner information less accurately in SO compared to SG. They also used more gestures referring to manner in spontaneous speech compared to controls. The total number of iconic gestures produced in spontaneous speech and gesture only conditions did not differ across groups. Yet, patients used more compensatory gestures than controls, whereas almost all gestures of controls were matching. For single case statistics, see Table 1.

Taken together, controls preferred to convey path information via gestures, however, when they could not do so, they could successfully express it in speech as well. This suggests that when gestures convey the imagistic properties of spatial events, healthy adults could prefer to convey this information via gesture by omitting it from speech (Melinger & Levelt, 2004). Yet, we also found that three patients who were especially impaired in describing manners compensated this problem by using gestures, suggesting that gestures might work as a true compensatory strategy for people who have speech impairments. Thus, gestures might serve differential roles for speech production processes for different populations.



Perspective shift and embodiment markers in signed and spoken discourses

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This paper aims to compare speech, signed and gestural marking of discursive perspective in langue des signes québécoise (LSQ) and French. The distribution of linguistic (lexical, morphosyntactic) and embodied forms (corporal, facial and vocal attitudes) of perspective shift produced by Deaf LSQ signers and hearing Quebec French speakers are analyzed. The use of embodied gestures and perspective changes has been studied in order to account for the multimodality of language (McNeil, 1992; Parrill, 2010). Iconic co-speech gestures have been described as a representation of a character's point of view (Cassell and McNeil, 1991; Parill, 2012). Perspective shift is seen as a change from an external point of view of an event to an internal one (Debreslioska, *et al.*, 2013).

The gestures studied are very similar to narrative structures in sign languages, namely role shift (Padden, 1986), constructed action (Metzger, 1995), referential shift (Poulin et Miller, 1995), enactment (Ferrara et Johnston, 2014) and corporal representation (Saunders, 2016). These are used not only to report the speech, but also the gestures, actions or thoughts of a character (Ferrara & Johnston, 2014). The use of embodied gestures in perspective shift has been identified as one of the principal differences between signed and spoken discourses (Earis & Cormier, 2013). It is emphasized that sign language users are culturally conditioned to telling stories *in situ* (Marentette *et al.*, 2004). We propose a descriptive statistical portrait of the distributional patterns of marker forms and of the nature of embodiment in the accounts of Deaf native signers (LSQ), Deaf non-native signers of LSQ whose L1 is French, and hearing Quebec French speakers. The following two questions are considered for this study:

- 1) Is the frequency of perspective shift markers distinct between signed and spoken discourses?
- 2) Are the distributional patterns for the forms of perspective shift markers and the natures of embodiment comparable between signed and spoken discourses?

The forms considered in this study are: lexical (verb of expression, reported speech formulation), morphosyntactic (tense marking change, shift of pronoun/indexical and referential space), prosodic (embodiment through intonation), corporal (embodiment through head, eye gaze, body) and facial (embodiment through facial expression). A dataset of 36 narratives has been assembled, using the following groups: 3 Deaf native LSQ users, 3 Deaf non-native LSQ users, and 3 hearing native Quebec French speakers. Variables considered for analysis are frequency, marker forms, nature (dialogue, action, gesture, thought), language (LSQ, French) and group (Deaf native signers, non-native signers and hearing speakers).

Preliminary results suggest i) a higher frequency of embodiment in signed discourses compared to spoken even though their corresponding iconic gestures exist in French, and ii) a higher frequency of embodiment in the discourses of native signers compared to those of non-native signers.

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Tight link between pointing gestures and spatial demonstratives is unidirectional

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Perhaps the most fundamental property of human communication is that it allows us to refer to entities (objects, agents, actions) in the world around us. To establish joint attention to a referent in everyday communication, people commonly use linguistic expressions in close temporal alignment with deictic bodily actions such as pointing gestures. Particularly spatial demonstratives and index-finger pointing gestures canonically co-occur in everyday spoken referential communication. The large majority of the world's spoken languages contain more than one type of spatial demonstrative (e.g. English *this* and *that*). This has raised the longstanding question which factors determine whether someone uses one demonstrative term and not another while pointing at a referent.

One prominent theoretical account argues that proximal demonstratives (e.g. *this* in English) are used to refer to objects in a speaker's peri-personal space, whereas distal demonstratives (e.g. *that* in English) are used to refer to objects in a speaker's extra-personal space. This speaker-centric account is supported by data elicited in the so-called 'memory-game paradigm' in which participants are instructed to refer in speech and gesture to objects placed at different locations on a long table. Previous studies using this paradigm forced participants to use a spatial demonstrative as the determiner on 100% of the trials. The aim of the present study was to test the implicit assumption that participants indeed naturally use a spatial demonstrative when their referential utterance includes a pointing gesture.

The present study thus adapted the memory-game paradigm to test the tightness of the link between spatial demonstratives and pointing gestures. Participants referred to objects placed on twelve different locations at a table in front of them by using a determiner, adjective, and noun (e.g., *that blue triangle*) paired with a concomitant index-finger pointing gesture. The current study let participants ($N = 20$) free to use the determiner of their choice, thus also including the possibility to use definite (e.g. *the blue triangle*) and indefinite articles (e.g. *a blue triangle*) paired with their pointing gesture.

It was found that participants used demonstratives on only 29.1% of trials (see attached Figure 1). In general, this result questions the ecological validity of this commonly used experimental paradigm for studying the production of spatial demonstratives. More importantly, these findings suggest that although the use of spatial demonstratives in reference to entities in one's immediate environment is not commonly observed without an indexical body movement such as a pointing gesture, the reverse does not hold. Pointing gestures were naturally combined with definite articles in everyday referential utterances. It is therefore concluded that the close link between pointing gestures and spatial demonstratives is only unidirectionally tight.



Transforming thoughts with hands: A case study of co-operative gesture in collaborative meaning-making in psychotherapy

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The role of embodied aspects of interaction such as gesture, facial displays, and body-posture in establishing interpersonal emotional attunement, cooperation and mutual understanding has been studied extensively from both a micro-analytic interaction studies perspective (e.g. C. Goodwin, 2000, 2017; M. H. Goodwin, Cekaite, & Goodwin, 2012; Meyer, Streeck, & Jordan, 2017) as well as a quantitative socio-dynamical perspective (e.g. Louwerse, Dale, Bard, & Jeuniaux, 2012; Riley, Richardson, Shockley, & Ramenzoni, 2011). In the context of psychotherapy, quantitative studies have reported that coordination of embodied interactional modalities such as hand movements and body-posture are related in significant ways to the quality of the interpersonal relationship between therapist and patient (Galbusera, Finn, & Fuchs, 2016; Ramseyer & Tschacher, 2011, 2016). The therapeutic relationship, in turn, has been identified as a central common factor in achieving successful psychotherapeutic outcome. However, a majority of these studies measure the overall coordination of bodily behaviors, and do not distinguish between e.g. different types of gesture nor different types of hand movements altogether, and thus, there is a vacuum in the literature investigating specific types of closely coordinated interpersonal gestural phenomena in psychotherapy.

In this study, we draw on this existing body of studies, with a twofold aim 1) expanding the body of empirical work of multimodal interactional studies in psychotherapy as well as 2) presenting a case study qualifying in particular ways the notion of “hand movement” coordination. In doing so, we draw on the notion of co-operative action (C. Goodwin, 2013, 2017) presenting a focus on the unfolding intertwining of two interactants’ gestural productions. In the talk, we will present video data from a naturally occurring psychotherapeutic interaction, showing how the therapist and patient engage in re-iterations and transformations of each others gestural productions in a way that become a resource for establishing a novel and collaboratively constructed mutual understanding of the patient’s problems. Thus, the study presents a micro-analytic approach to the study of coordinated embodied behavior in psychotherapy that aims at providing insight into the meaningful unfolding interpersonal and communicative activities in psychotherapeutic interaction.

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Does gesturing affect sensorimotor knowledge? A pre-registered study

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Previous research has shown that co-speech hand gestures might affect sensorimotor knowledge of manual routines (Beilock & Goldin-Meadow, 2010; Cooperrider *et al.*, 2015; Trofatter *et al.*, 2015). The general finding is that when subjects gesture in ways that signify features key to the manipulation of a problem-solving task, subsequent performance is impaired on the same task with different physical features (here: weight of objects). These studies suggest that describing physical interactions with the environment using gestures strengthens such sensorimotor manual routines, which is sensitive to objects' weight. In the current study, we aim to further assess this sensorimotor-strengthening hypothesis (SSH). A more conclusive test is needed, we argue, due to possible methodological shortcomings of previous studies (e.g., small sample sizes and not a direct measure of sensori-motor information).

In the current study, as a way to assess strengthening of action-relevant information, subjects judged the weights of objects from memory. This contrasts with the above-cited studies that assessed problem solving speed as an indirect measure of sensori-motor competence. The objects were manipulated to generate a size-weight illusion: objects that are of the same weight but different in size are consciously perceived to differ in weight. This size-weight manipulation was used to dissociate whether gestures strengthen perceptual consciousness, or rather tap into sensorimotor routines, which has been shown to become dissociated in the size-weight illusion. We assessed whether weight judgments of the objects that were used in a previous problem-solving task were affected by whether participants subsequently explained the task with gestures (gesture condition), explained the task without gesturing (no-gesture condition), or did not explain the task (no-explanation condition; between-subjects: 159 participants). We predicted that, based on the idea that gestures strengthen sensorimotor knowledge of previously performed manual routines, gesturing would affect weight judgments of the previously manipulated objects as compared to the conditions where gesture is prohibited.

Preliminary results ($N = 146$) of our pre-registered confirmatory hypotheses show no evidence for the effect of condition (gesture vs. no gesture vs. no explanation) on weight judgments, $F(2, 143) = 0.34$, $p = .713$, $Partial\ eta^2 = .005$. Also no effects of condition on differences were found in weight judgments between small and large (but equally weighted) objects, $F(2, 143) = 0.35$, $p = .704$, $Partial\ eta^2 = .005$. Bayesian analyses with a default non-informative prior indicates that the data are between 12.92 to 143.13 times more likely under the null-hypotheses (strong to extremely strong evidence for the null-hypothesis). The current results do not conceptually replicate previous findings which show overall effects of gesture conditions on sensorimotor knowledge (Beilock & Goldin-Meadow, 2010; Cooperrider *et al.*, 2015; Trofatter *et al.*, 2015). However, important additional analyses still need to be conducted that further assess possible hidden moderators, such as types and frequency of gestures. The final analyses will be presented and discussed in light of possible relevant differences as compared to previous research.



Recipients' vocalisations during object transfers

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The handing of objects from one person to another is a fundamental accomplishment on which many everyday and technical tasks rely. Although multimodal request sequences have recently been examined (e.g. Stevanovic & Monzoni, 2016), object transfer, or object hand overs, themselves have received comparatively little attention. Notable exceptions are conversation analytic (CA) studies (CA) Roberts (1977) and Wootton (1994), and studies relating human-machine interaction (e.g. Basili *et al.*, 2009).

Previous work (author, unpublished), based on the multimodal CA applied to video-recordings of naturally occurring interactions has shown that when a person requests an object, there are three regular phases in the course of an object transfer when a vocalization is produced: (1) when the requested party moves to get the object, (2) around the time of the hand over, (3) when the object has been handed over). Whilst “thank you” tokens (e.g. “cheers” or “thanks”) are commonly used, only phase (3) corresponds to the familiar locus for an expression of gratitude; talk at phase 2 had not been previously described. That previous work showed that, on occasion, talk at phase 2, can play a role in the successful completion of the hand over.

Through a detailed analysis of the trajectory of this collection of hand-overs, the present paper shows that phase (2) vocalisations are not related to the hand over itself but rather to *the object reaching the place of hand over*. In order to further examine this, a hybrid CA-experimental study is reported. A large corpus of object transfers was collected (in the course of a cover task in a laboratory setting) and analysed (a) using Conversation Analysis (b) using a quantitative coding scheme based on the Conversation Analysis. The data support the previous analysis that, on the occasion when a phase (2), vocalisation occur, they correspond to the object arriving at the place of transfer.

The paper concludes by discussing the implications of vocalisations in object transfer sequences and presents the design of two experiment studies that aim to confirm the importance of phase (2) vocalisations for the accomplishment of object transfer.

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Perspective shift in L2 Sign Language learners

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Discourse chunks usually involve multiple characters. The perspective of multiple characters in sign languages can be expressed through a mechanism called perspective shift. It is signaled by adjusting the eyes, the head, and/or the body slightly to the side in gestural space, which shows that the signer is taking on the perspective of whoever is associated with that location (Padden 1986, Engberg-Pedersen 1995, Lillo-Martin 1995). The term covers a similar phenomenon called constructed action, as described by Liddell (1998), Liddell and Metzger (1998), Liddell (2003), and Cormier *et al.* (2013) among others. There are three types of perspective shifts: character perspective, observer perspective and mixed perspective (Perniss 2007, Emmorey 2002).

Are there differences between second sign language learners and native signers in terms of the production of perspective shift? Is there a learning progression in mastering narrative competency with special respect to perspective shift?

Forty hearing learners of German Sign Language (DGS) participated in the study, ranging in age from 19 to 27 years. Participants were classified into two groups according to the year of sign language exposure (L2) and exposure to the visual-gestural modality (M2) in the classroom at a university: (a) first-year learners and (b) second-year learners. Five Deaf native signers of DGS served a control group. Participants were asked to watch a short video clip (with up to three characters) and to look at illustrations of a story and asked to produce signed narratives. Utterances were annotated using ELAN software. The following information was recorded: types of perspective shifts, frequency of perspective shifts and length of perspective shifts. To date, the analysis focused on a small portion of signed narratives based on illustrations.

With regard to the number of utterances with observer perspective, there are no significant differences between first-year learners (10,9 on average) and native signers (10 on average). Second-year learners produced a higher number of utterances with observer perspective (17 on average). This finding also applies to utterances with character perspective. On the other hand, the number of utterances with mixed perspective produced by native signers is significantly higher (5,7 on average) than first-year learners (3,7 on average) and second-year learners (2,5 on average). The length of utterances with perspective shifts in native signers is significantly lower (32 sec on average) than those in first-year learners (124 sec on average) and second-year learners (130,7 sec on average).

Based on the above findings, several issues came up, which will be discussed: a) the role of gestural transfer in L2 learning of perspective shift, b) cognitive load in L2 learning of perspective shift, c) the role of structural iconicity of perspective shift in L2 learning and d) fluency in signed narratives.

Gesture visualizations exploring multimodal correlations

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Exploratory data visualizations can facilitate investigation of relationships between variables and features, and generate insights into which questions the data at hand can answer. In studies of co-speech gesture, the typical visualization is a line drawing of one or multiple frames of video, occasionally accompanied by an overlaid trajectory path, and supplemented with video frame time-aligned annotations based on microfilm, as seen in Kendon and McNeill papers in the 1980s. Others have developed time-aligned graphical visualizations based on the graphical interfaces of multimodal annotation tools such as ELAN and ANVIL. While undoubtedly useful, these approaches often do not take full advantage of the visual possibilities for further unveiling gesture-speech relationships.

While advances in infrared motion tracking technology like the Microsoft Kinect enable more detailed gesture tracking, they require a level of technical know-how that complicates gesture annotation, and require additional human interpretation. Importantly, they cannot be applied to preexisting annotated datasets and videos that have been carefully annotated over the decades.

We present a body of work in visual exploration of a 30-minute American English academic lecture video, employing a wide range of visualization methods. These include trajectory sketch renderings, tracked fingertip position animations, time-aligned displays of gesture phases (including strokes) and pitch-accented syllables, and interactive html discourse transcript. This analysis method also reveals emergent patterns in gesture sequences and enables convenient analysis of the relationship between co-speech gestures and discourse structure. Importantly, many of these visualization methods can be applied to existing annotated gesture corpora. These visualizations also illuminate questions about whether the established annotation system for co-speech gesture, which often involves assignment to mutually exclusive categories (such as referential vs. beat-like), could be advantageously supplemented by a more complex dimension-based annotation system.



The performance of parentheticals: Multimodal marking of medial asides in North American English

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Prior research on attitudinal and epistemic stance-taking in language has focused on the plethora of coding devices that tend to manifest themselves at the left- or right-periphery in utterances (Biber *et al.* 1999, Traugott 2015), as shown in the quite disparate (and constructed) English examples in (1)-(2):

- (1) **Obviously**, he has no idea what he's doing.
- (2) He'll be vacating his office tomorrow, **I suppose**.

The heterogeneity of stance expressions is matched by the variety of stance categories that get signaled (*cf.* Precht 2000): OBVIOUSNESS, SURPRISE, (DIS)AFFILIATION, CONCESSION, CERTAINTY, DOUBT. In earlier work, we have analyzed the co-speech behaviors (shifts in gaze, facial expression, head position, posture, and gesture) that regularly accompany the expression of certain stance markers in North American English, noting among other things that the more subjective or intersubjective the stance taken, the more likely that any co-speech gesture will trigger movement in the upper body, in addition to the hands. In this study, we focus specifically on the use of stance elements that surface *medially* in an utterance, as asides or other types of subjective and seemingly extraneous comments. Two general classes of these medial asides include the (highly stanced) subordinating conjunction, *although*, as well as non-restrictive relative clauses headed by *which*, both of which are frequently followed by a secondary stance marker. Some attested examples from COCA (corpus.byu.edu) are shown in (3)-(4):

- (3) Not much has changed over the years, **although, sad to say**, they did discontinue...
- (4) And I remember those days, too, **which is great, but you know**, if I'm sitting home & reading...

As “toss-off” comments, these qualifiers are somewhat orthogonal, if not disruptive, to the flow of discourse and, interestingly, they are frequently matched by co-speech behaviors that depart from bodily actions that precede or follow the aside in the frame utterance. Using the Little Red Hen multimedia database (redhenlab.org), this quantitative study examines the highly specific prosodic and embodied means that regularly accompany particular parenthetical expressions in spoken North American English. We found that the individual bodily articulators used (hands, head, eyes, brows, shoulders, torso) and the form these bodily articulators take (e.g., open palm, tilt, squint, raise, shrug, pivot) are reliably associated with particular expressions or types of asides, as well as with particular discourse junctures (*cf.* Kendon 1995). We thus add new evidence to support the mounting call in cognitive linguistic circles that the construction, as the primary unit of linguistic analysis, needs to be re-considered as a multimodal entity, with verbal, prosodic, *and* kinesic form accompanying the particular semantic and pragmatic meanings that inhere (*cf.* Cienki 2015, Zima & Bröne 2015, and the collection of papers in Zima & Bergs [eds.] 2017).

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Reflections on the integration of gestural and linguistic elements in enactment structures

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Co-speech gestures are discussed as having various different functions (Cassell & McNeill, 1991) and that these can be analyzed as part of various different points of view that the speakers assume. These points of views are identified as that of a narrator, an observer, or a character (Parrill, 2012). Moreover, similar gestures are found in enactment structures (also known as roleshift or constructed action) where signers reconstitute remarks, actions and thoughts of others in their signed discourses (Cormier *et al.*, 2015). The enactment structures are highly gestural since they allow the signers to incorporate the attitudinal behaviours of the characters while their remarks or actions are reconstituted in signed discourses (Quinto-Pozos, 2007). Within the enactment structures, the signs, as lexical material, are seen to be tightly interwoven with the gestures (or non-conventional expressions) where such characters are visually represented by signers' bodies in signed discourses (Ferrara & Johnston, 2014).

The objective of this paper is to address the theoretical issue where lexical (conventional) and gestural (non-conventional) structures are tightly integrated to form enactment structures in signed language discourses using the same physical articulators. In this presentation, we analyse two different approaches which offer different hypotheses concerning the nature of enactment structures in sign languages grammar: i) the Generative Grammar perspective which proposes a syntactic description, and ii) the Cognitive Grammar perspective which focuses on its symbolic nature.

The simultaneous incorporation of negation in linguistic structure is highlighted as problematic by Kremers (2012) for the generative approach. Examples are found in LSQ which distinguish the role of a headshake which is analyzed as linguistic, such as negation which intervene in the semantic construction of a VP, or as gestural, denoting a form of disbelief on the part of the character reconstituted in enactment structure, which is produced in parallel to the VP. In Cognitive Grammar, the conventional and non-conventional expressions are constructed as a symbolic unit, which contains a semantic structure with its own phonological structure (Langacker, 1991, 2008). Such units can be combined in a recursive manner with both linguistic and gestural structures into a complex structure. This allows the construction of a headshake to associate itself with the VP or with the construction of enactment structure. Furthermore, this approach corresponds to the nature of enactment structures which allow the interdependence between these two types of structures in signed discourses.

We conclude that enactment structures show a high degree of interdependence of conventional and non-conventional expressions (Wilcox & Xavier, 2013). These structures are highly uniform in term of frequency across LSQ signers whereas their corresponding iconic gestures representing characters exist in Laurentian French, but they are less frequent and used without uniformity (Parisot & Saunders, in preparation).

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Directional adverbial constructions: A point of syntactic and semantic integration of gestures into grammar?

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Gestures display a complex semantic interplay with speech and contribute to the semantics of verbal expressions and/or the whole utterance (e.g. Kendon 2004; McNeill 1992/2005). Investigating spatial language, there have been many studies in the recent years dealing with the question of how languages encode motion events and spatial relations and form multimodal patterns (e.g. Fricke 2007; Kita & Özyürek 2003; Müller 1998; Tutton 2016).

My talk addresses co-speech gestures from the viewpoint of a multimodal approach to grammar (Fricke 2012) and provides further evidence for the interplay of gesture and speech on the syntactic and semantic level exemplified by a particular construction type of directional adverbials in (colloquial) German (*cf.* (1)).

- 1) a. *durch das Loch durch*
through the hole through
'through the hole'
- b. *in das Holz rein*
into the wood in
'into the wood'

As shown in previous studies, gestures can be integrated into the syntactic structure of an utterance (*cf.* Enfield 2009; Fricke 2012/2013; Harrison 2009; Ladewig 2014; McNeill 2005). Moreover, they can fulfill the function of syntactic constituents both, with aligned speech or even instead of a verbal unit by replacing them (Ladewig 2012/2014). Furthermore, gestures modify in a particular way the meaning of spoken language expressions or take over attributive functions in expending noun phrases over several deictics like *son* ('such a'), for instance (Fricke 2012/2013).

In my talk, I will now address the multimodal modification in constructions illustrated in (1). These types of AdvPs are particularly interesting, because of the specific configuration where certain PPs precede another directional preposition or adverb, if they have the same directional dimension. Thus, I will show how different modifications occur locally as well as domain-related. Moreover, I address the crucial relation of PP and Adv and whether gestures contribute to clarification through the function they fulfill. Furthermore, because these AdvPs function as directional complements of motion verbs, for instance, I will also discuss how gestures behave in different syntactic configurations the construction is part of, e.g. passive voice constructions or embedded clauses.

My argumentation is based on a first corpus study of iconic gestures. The data were collected in a semi-experimental dyadic setting (18 subjects). The study focused on the production of the explanatory subject, so the captured video material is about 67 min. of pure explanation time (9,935 words; 1,048 iconic gestures with nearly 70% of analyzed data).

Using ELAN (Wittenburg *et al.* 2006), an annotation schema was developed to transcribe, POS-tag and lemmatize speech and also several form parameters of gesture. The audio was first segmented with MAUS (Schiel 1999) to ensure to co-analyze both modalities over time.



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Neural integration of semantic information from speech and iconic gesture in children

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Children typically learn language in a multimodal environment as their caregivers interact with them using a variety of modalities¹. Particularly, hand gestures are an important communication medium for children, because gestures are often used by caregivers to convey information along with speech^{1,2}. By using behavioural measures, research has so far revealed that children can integrate information from gesture and speech³⁻⁵. By using the electrophysiological (EEG) measure, some studies with adults focused on the N400 component^{6,7}, which indicates semantic integration process. They found that a larger N400 effect was elicited when adults saw a gesture-speech incongruent combination than when they saw a gesture-speech congruent combination⁶. However, little is known about the on-line cognitive processes underlying gesture-speech integration in children. Thus, this study examined the neurocognitive processing of semantic integration of gesture and speech in children by using EEG recordings.

Native Dutch speaking 7-year-olds participated (N=17, Mean age= 7.37, SD=0.46, 11 female). We created short video clips, where an actor uttered a spoken action verb and simultaneously produced an iconic gesture representing actions. Each clip had two versions of gesture-speech combination. In the congruent condition, the gesture and the verb conveyed the same information (e.g., a throwing gesture + a verb ‘throwing’), whereas in the incongruent condition, they conveyed different information (e.g., a throwing gesture + a verb ‘drinking’). The participants were instructed to attentively watch and listen to the clips. For each condition, 60 items were selected, which were all different verbs. While presenting the clips on a monitor, we measured children’s brain activity using EEG. To ensure attention to the clips, participants were given catch trials after some of the clips and asked to identify whether they heard a particular verb that did or did not occur in the preceding sentence (e.g., “Did you hear ‘throwing?’”) by pressing a ‘yes’ or a ‘no’ button.

The event-related potentials (ERPs) were time-locked to the speech onset. To compare the EEG data of both conditions, we selected a pre-defined time window for the N400 analysis (from 300ms to 600ms after speech onset) based on previous studies⁶⁻⁷. A one-tailed t-test revealed one significant cluster between 326ms and 562ms after speech onset ($p < 0.025$). The amplitude of N400 was larger in the incongruent condition than in the congruent condition, and the N400 effect was pronounced over central-parietal electrodes.

This is the first study that examined the neurocognition of how language processing develops in a slightly more ecologically valid way, by using a multimodal presentation of linguistic stimuli. Our findings show for the first time that neural basis for speech-gesture integration appears to be in place already at the age of 7. This has implications for using gestures towards children by adults in multimodal communicative settings.

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When multimodal systems collide: Interpreting multimodality between hearing and deaf interactants engaged in a shared task

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The gesture-sign interface is striking when seen in tandem. Interpreted interactions between Deaf and hearing people present a unique opportunity to examine how two “semiotically diverse systems” (Kendon, 2017) collide. Applying the works of C. Goodwin (2013) and Streeck (2009), this study explores the nature of the sign-gesture interface through a micro-analysis of a team-building exercise between Deaf and hearing co-workers and an interpreter.

Deaf and hearing colleagues have several semiotic channels with which to communicate: gesturing, lip-reading, and writing are just a few. But these channels have limited communicative capital that is quickly spent in extensive interactions. When an interpreter is involved, how is kinesic content interpreted? Do Deaf and hearing people create a joint activity space where they communicate meaning with each other directly? Does the interpreter carry any kinesic content across language in her interpretations? Interpreters have been described, more recently, as “narrative mediators” who “(re-)author” their participants’ stories (Baraldi, 2012, 298). To see how the interpreter in this exchange re-authored the utterances, the researcher closely transcribed embodied moves of each interlocutor in ELAN then used a micro-analysis (*cf.* Streeck, 2009) to determine whether and how visible elements were perceived by the participants, and whether and how the interpreter crafted interpretations to include those elements.

Two constraints were immediately apparent – both of which tied to visual perception. First, the lag time required to produce the interpretation resulted in asynchrony of visible cues. That is, the participants saw embodied moves produced by their interlocutors *prior to* reception of the interpretation thus resulting in a rupture in the synchrony of composite utterances (Enfield, 2009). Second, because they were communicating through signed language, the Deaf person and the interpreter had to shift gaze from the joint activity to the interpreting activity and back again. This split attention resulted in the interpreter re-packaging embodied content for the participants so that the composite utterances were both synchronically tied to, and culturally consistent with, her respective audiences.

In these data, then, “source language intrusions” (Sequeiros, 2002), also occurred in the gesture domain; the interpreter perceived kinesic units (co-expressed with sign or speech) that she then replicated or altered as integrated with composite utterances in the interpretation. There were also semiotic fields that the interlocutors accessed directly to convey meaning without the interpreter, including deixis and eye gaze-shifts, as well as depictions of the container the co-workers were building. The analysis shows that all participants contributed to the joint construction of the activity space, regardless of the language they used. The re-authoring of kinesic content across languages shows that the interpreter was attuned to the inherent multimodality of the spoken language as well as the signed language.



What can we learn about covert negation from co-speech gestures? A view from Israeli Hebrew

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Traditionally, the most essential criteria for negativity are the presence of a negative particle and the occurrence in a specific syntactic environment (Ayer 1963). However, according to Lewandowska-Tomaszczyk (1996), the identity of negation does not depend solely on the overtly expressed negative words, and the negative identity of some linguistic units may be covert. We will show that the negativity of such linguistic units may be uncovered by gestures. The present study will examine different uses of the gestures that are usually associated with explicitly expressed negation in spoken Israeli Hebrew to reveal categories of covert negation.

To this end, we compiled a 20-hour corpus of TV interviews in Hebrew among over 50 speakers. First, we identified several recurrent gestural patterns that co-occurred with grammatical negation expressed by morphosyntactic elements or lexemes with inherent negative meaning. In the second stage, we searched for utterances that were accompanied by the same gestures that did not contain markers of grammatical negation and attempted to determine the motivation of the co-occurrence of these gestures with those utterances.

The analysis uncovers hidden negative structures of different types at the level of discourse, sentence, and single lexical items. For example, these gestures may indicate implicit negation that is not part of the propositional content of the utterance. In one of the examples, the interviewee was asked whether her mother, who had been struggling with cancer, still wanted to live or if she preferred to die. The speaker answered: “She wanted to live until the last moment,” using a gesture that was usually associated with grammatical negation. We propose that the negation expressed here was in fact implied by the words uttered, namely, “She did not want to die.”

In other contexts, these gestural patterns may co-occur with an expression of intensification, such as *absolutely*, *totally*, or *completely*. These uses contribute to understanding intensification as a rejection of implied alternatives in context. Moreover, these patterns may co-occur with discourse markers that imply negation or restriction as part of their procedural meaning.

The fact that the same gestural patterns are used to indicate explicit (grammatical) negation and implicit (covert) negation suggests that these gestures indicate a higher abstract notion, namely, *negativity* rather than negation. Grammatical negation, therefore, should be considered one of the expressions of negativity. This analysis is in line with the cognitive approach to negation initiated by Lewandowska-Tomaszczyk (*ibid.*), and it explores deeper levels than syntax and morphology to “cover the negation incorporated in words, discourse or knowledge frames.” Furthermore, these findings contribute to the claim that there is a conceptual affiliation between speech and gesture that goes beyond individual linguistic segments (de Ruiter 2000; Kirshof 2011).

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Creating sense with nonsense: Pervasive use of iconic co-vocalized gestures in artistic settings

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Non-lexical vocalizations (see Reber, 2012 for review) and gestures are re-occurring phenomena in dance rehearsals and an integral part of the dance learning and teaching processes (Keevallik, 2015; Müller & Ladewig, 2013). Take for example the following extract from a choreographer's instruction to a dancer:

1) *Five, six, seven, eight... Go! ...UM pa tsa UM pa pa pa ya tsa UM pa*

There is numerical counting, an imperative, and a sequence of co-gestured vocalizations that “give off” (Goffman, 1963) coordinating information for the dancer. It is well-established that non-lexicalized vocalizations and gestures are among humans' fundamental communicative tools; nonetheless, how co-gestured vocalizations regulate situated actions in artistic settings, and how they motivate collaborative creative processes, remains an unaddressed question.

Cross-linguistic research on vocalizations (i.e. sound symbols, onomatopoeia and ideophones; Knoeferle *et al.*, 2017; Dingemanse, 2012; Perniss, Thompshon, & Vigliocco, 2010) has mainly been concerned with iconicity in spoken languages, with supplementary information about the real or metaphoric objects or events in the discourse (about shape and size (Parise & Pavani, 2011; Tsur, 2006), manner of motion (Imai & Kita, 2014), spatio-temporal aspects of actions (Perlman, 2010; Shintel *et al.*, 2006)) being encoded during speech production. Iconicity in speech also exhibits qualities closely matching with those of iconic manual co-speech gestures (Perlman, Clark, & Johansson Falck, 2015).

The aim of this study is to analyze co-gestured vocalizations in a collaborative environment. Correspondences between a) the prosodic properties of a choreographer's vocalizations and affiliated gestures in dance rehearsal and b) the visual-spatial qualities of the dancers' performances will be used as indicators of iconic mapping. Moreover, the question of conventionalization of previously non-lexicalized vocalizations will be addressed.

A qualitative-quantitative analysis of encounters between choreographer and dancers was carried out during 20 rehearsal sessions. The transcription of choreographer's speech and the extraction of prosodic information in his vocalizations were performed in PRAAT (Boersma, 2001). The quantitative annotation work of non-verbal behavior was conducted in ELAN (Lausberg & Sloetjes, 2009) following the coding system of (Author's). Choreographer's and dancers' interactions were analyzed using qualitative categories consisting of preparation, pausing, demonstrating, supervising, and “body quoting” (Keevallik, 2010).

Preliminary observations suggest that the number of vocalizations uttered during dancers' demonstrations increased over time compared to lexical words. This predominance might indicate that these vocalizations gradually achieved a status akin to a conventionalized lexicon. Formally, the vocalizations are monosyllabic and “synthetic” sound symbols (Hinton, Nicholas, & Ohala, 1994) in consonant-vowel constellations. Functionally, iconicity in vocalizations and gestures serve to coordinate dancers' movement qualities. A more fine-grained analysis of the prosodic features and the link to the dancers' body movements will be presented.



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Functions of gestural holds in language learning interactions

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Gesture and other body movement have been recognized to play an important role in instructional interactions (e.g., Churchill *et al.*, 2010; Hudson, 2011; Lazaraton, 2004; Pozzer-Ardenghi & Roth, 2008). Teacher and student gestures have been found particularly important in language learning interactions due to their intrinsic connection to speech (e.g., Eskildsen & Wagner, 2015; Matsumoto and Dobbs, 2016; Rosborough, 2011; Smotrova & Lantolf, 2013; Zhao, 2007). In examining the role of gestures in language learning interactions, studies have largely focused on dynamic aspects of gesture—the hand motion itself—without giving enough consideration to the moments when speakers suspend their gestural movement in the form of a *hold*. Meanwhile, gestural holds are reported to play an important role in instructional as well as ordinary conversations (e.g., Cibulka, 2016; Groeber & Pochon-Berger, 2014; Sikveland & Ogden, 2012). However, their specific functions remain under-researched. This study examines the functions of gestural holds in teacher-student and student-student interactions in an ESL classroom.

The study employs the theoretical framework and methodology of McNeill's (2005) gesture analysis combined with the elements of conversation analysis (e.g., Have, 2007) to investigate the use of gestural holds in ESL classroom interactions. It analyzes classroom videos drawn from a 35-hour corpus of recordings made in an intensive English program at an American university. The participants include a NS instructor and 12 adult learners of English in a beginning-level reading class.

Results suggest that gestural holds employed by the teacher and students in their classroom interactions fulfilled a range of important functions. Holds were used by the teacher as part of her elicitation technique, which helped to elicit correct responses from the students. Teacher holds were also part of comprehension checks, which helped the teacher to elicit student signs of understanding. Student gestural holds were employed in requests for clarification and confirmation, helping to maintain the floor and elicit the teacher's responses. In addition to these interactional functions, gestural holds were also found to fulfill important discourse functions, such as discourse segmentation and topic management, where they served as visual anaphoric references to the main topic. In fulfilling these functions, gestural holds exhibited features specific to instructional interactions along with the features pertaining to ordinary conversations. Importantly, they appeared to contribute to the process of classroom teaching and learning in beneficial ways.

The study has implications for research on gesture in instructional interactions by identifying the functions of gestural holds and their important role in maintaining mutual understanding and discourse coherence, which can facilitate language teaching and learning. The study also contributes to the broader research on gesture by identifying the features and functions of holds relevant not only to language learning interactions, but communication in general.



Patterns of co-speech gesture in conversations involving hearing impaired adults and their frequent communication partners

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As a consequence of acquired hearing impairment (HI) communication difficulties in the form of speech comprehension frequently arise. Despite the use of hearing technology such as hearing aids or cochlear implants residual speech perception difficulties commonly remain, particularly in difficult listening environments. Consequently, an individual with significant HI may need to rely more heavily on available visual information to augment spoken communication. It has long been recognized that the addition of visual information provided by the articulators tends to improve overall speech perception (known as lip-reading) and may help to address these residual communication difficulties. Nonverbal communication, including hand and arm gestures, facial expressions, gaze and body posture has been explored as potential compensatory behaviour for individuals with spoken communication difficulties. Yet the impact of hearing impairment (HI) on the use of such extra-verbal visual communication cues has received limited research attention. Aural rehabilitation texts and intervention programs often refer to the importance of nonverbal cues including gesture. An evidence base for such recommendations, however, has yet to be established and it remains to be determined how gestures are used in everyday conversations involving HI adults and their conversation partners.

The aim of the current study is to investigate the impact of acquired HI on co-speech gesture during conversational interactions. Interactions between a HI adult and a frequent communication partner (FCP) (without significant hearing impairment) were audio-visually recorded. Comparison recordings were also made between the original FCP and a second CP (who did not have a significant hearing impairment). The conversations were filmed within a quiet, comfortable well-lit university clinic room. The talk was transcribed using conversation analytic (CA) style techniques. Transcription and coding of co-speech gesture was conducted following guidelines provided by McNeill (1992) and for gaze by Skelt (2006), comprising examination of co-speech gesture type, size, timing and gaze direction during gesture production.

Preliminary case study results indicate that the FCP did not alter gesture type, size or timing during conversations with a HI communication partner when compared to conversations with a FCP without HI. Analysis of FCP gaze direction during co-speech gesture production showed that, during a narrative task, in the presence of a HI communication partner the proportion of co-speech gestures produced with gaze directed at the listener increased.

These results provide initial insights into the influence of HI on the use of co-speech gesture and gaze in everyday conversation and the ways in which gesture might be used to reduce or resolve communication difficulties involving HI adults. Ultimately it is anticipated results from this ongoing study will help to inform aural rehabilitative practice/s including the (conversational) training of familiar communication partners.



Speech and gesture development of Xhosa speakers learning English

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Cross-linguistic motion event research has shown that speakers of typologically different languages have different patterns of thinking for speaking linguistically and gesturally (McNeill & Duncan, 2000; Slobin, 2006; Talmy, 2000). For example, speakers of verb-framed languages, like Spanish, express path linguistically and gesturally with verbs, while speakers of satellite-framed languages, like English, express path linguistically and gesturally with satellites (Stam, 2017). Studies on second language (L2) learners' linguistic and gestural thinking for speaking patterns have found that in some cases, L2 learners were still thinking for speaking in their first language (L1), whereas in others, their thinking for speaking patterns were somewhere between their L1 and their L2 (Stam, 2015). All of these studies, however, were with adult L2 learners, and none were with speakers of African languages.

Consequently, we conducted a study to examine the L2 English development of motion event expression in children who speak Xhosa, a Bantu language, as an L1. Bantu languages according to Talmy (2000) are verb-framed. Therefore, we also investigated whether the children's gestural expression of path in Xhosa was similar to that of speakers of Spanish, another verb-framed language.

This paper discusses the multimodal expression of motion events of Xhosa speaking children learning English. Two groups of Xhosa learners of English, 9 to 10 and 11 to 12 years old, were videotaped narrating two episodes of the Sylvester and Tweety Bird cartoon, *Canary Row*, in English and in Xhosa. We compared where the stroke of the path gesture occurred (with verb, satellite, ground noun phrase, more than one element, or *other*) in the children's narrations in the two languages (Stam, 2017). We then compared the English results with Stam's (2017) results for adult native English speakers and the Xhosa results with her monolingual Spanish speaker results for the same two episodes.

Results show that the learners' thinking for speaking patterns are affected by both age and languages. Both groups produced more path gestures with verbs in Xhosa, and the 11 to 12 year olds produced more path gestures with satellites in English. Additionally, the percentage of path gestures with verbs and *other* decreased and the percentage with ground noun phrases increased with age in English. Comparison of the learners' English results with Stam's English speaking adult results (Figure 1) suggests that the L2 learners' gestural expression of path is shifting as their L2 competence increases. Comparison of the Xhosa results with Stam's monolingual Spanish results indicates that Xhosa follows a pattern similar to Spanish for verbs (Figure 2), but not for other motion event speech elements. This suggests that not all verb-framed languages are the same and there is more at play than whether a language is verb-framed or satellite framed.

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A kinematic investigation into the phonetic reduction of reference marking in a young sign language

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Speakers and signers alike use an array of sophisticated strategies to establish reference to discourse entities and maintain the reference (Gernsbacher & Hargreaves, 1988; Engberg-Pedersen, 1993), whether in speech, sign or gesture (Campisi & Özyurek, 2014). The degree of explicitness of the reference depends on whether the referent is new or given (Ariel, 1990). One means of signaling this is the choice of referring expression -- either using full referring expressions, such as noun phrases (e.g., *the girl*), less explicit referring expressions, such as pronouns (e.g., *she*), or even zero marking. Thus, it has been reliably shown that first mention of a discourse referent is accompanied by more explicit marking (e.g., noun phrases) followed by reintroduction (i.e. introduction of a previously mentioned referent after a change in topic) and finally maintenance (i.e. referring to the same referent as previously mentioned) (e.g., pronouns). Another means of signaling information status of a referent is by phonetic reduction of reference form. For example, speakers and signers show phonetic reduction in repeated items, such as shortening and merging words in spoken (Ernestus & Warner, 2011), and signed discourse (Hoetjes *et al.*, 2014). While we know that signers reduce their referential marking during the course of a narrative, what is not known is whether signers of a young language are able to fine-tune their referring expressions from the outset of language emergence or whether this takes time to emerge? That is, do earlier generations (i.e. older signers) make less distinctive reductions compared to later generations (i.e. younger signers)?

Here we use 3D motion sensor technology (Kinect V2, 2013) to measure phonetic reductions in reference marking over the course of a narrative, in signers of Israeli Sign Language - a young sign language, only around 90 years old. We compare the signing produced by 15 deaf signers during the retelling of a Charlie Chaplin movie segment. First, we investigate which kinematic variables best account for the differences in discourse marking at first mention compared to reintroductions and maintaining a referent. Preliminary results reveal that a number of kinematic characteristics differ depending on whether the referent is new, reintroduced or continually maintained, including sign duration ($p < 0.005$), volume ($p < 0.005$), and speed ($p < 0.005$). For example, maintaining a referent was characterised by shorter sign length, smaller volume and faster speed, than first mentions of the referent. Second, we present kinematic measurements from signers of three age groups indicating that older signers use less distinctive reductions as their narratives unfold compared to younger signers. We propose that distinctions between information status of referents are more pronounced as a sign language develops over time, and suggests that the efficiency of the use of the body increases as the sign language matures.

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Gradual recruitment of body articulations for discourse structuring: Case study in a young sign language

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Sign languages signal several different linguistic functions simultaneously, using different parts of the body (Herrmann & Steinbach, 2013; Vermeerbergen *et al.*, 2007). It has been suggested that in young sign languages, different parts of the body are recruited gradually as the language matures, directly reflecting the emergence of linguistic complexity (Sandler, 2012; Maticic, 2016). Here we track this Grammar of the Body, to explore how different body articulators are recruited for marking the structure of text narratives across different age groups in a young sign language, Israeli Sign Language (ISL) - a language that originated only 90 years ago (Meir & Sandler 2008). Using a hierarchically organized model of discourse, we find (1) a relationship between the size/number of articulator movements and the level of depth in the discourse hierarchy (*cf.* Kendon 1980), and (2) differences across generations of signers that signal increasing complexity in the marking of levels of discourse with bodily articulators.

Research has shown that both speakers (e.g., Swerts, 1997) and signers (e.g., Boyes-Braem, 1999) distinguish discourse boundaries of different strengths with non-lexical devices. Based on these results, we hypothesize that weaker boundaries are marked by fewer and smaller articulator movements, while stronger boundaries are marked by multiple and larger articulators, and that distinctions between levels are more pronounced as a sign language develops over time. To test this hypothesis, we analyzed fifteen two-minute narratives from different age groups of ISL signers. We divided all narratives into text units using Rhetorical Structure Theory (Mann & Thompson, 1988). This theory is based on the semantic relations of one text segment to another (see Figure 1), which are organized in a recursive hierarchy of levels of discourse.

The results indicate that signers of all ages produced narratives which were characterized by several levels of discourse depth according to **semantic** criteria. However, only younger signers mark higher levels differently from the lower levels with **bodily signals**. Specifically, younger signers used either larger, multiple and/or more intense articulations (e.g., larger movements or longer holds) to signal higher levels of the discourse. These findings are compatible with observations for co-speech gesture: “*The larger the speech unit, the greater the difference in the form of movement and the body parts involved*” (Kendon, 1972: 204-205).

In contrast, older signers use large head and torso movements regardless of semantic depth. Moreover, younger signers also distinguish different types of RST relations (e.g. “elaboration” with squinted eyes). In sum, the findings suggest that, as the language matures, the mapping between linguistic and semantic complexity becomes increasingly aligned. The present study provides intriguing evidence for the increasing complexity in the system across age groups as a language develops from gestural roots into linguistic form.

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Composites of gesture and speech in concept development by Chinese speakers of English

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This paper is concerned with idiosyncratic, representational gestures that have been studied in their relationship to cognitive processes (Alibali *et al.* 2013; Kita 2000; Goldin-Meadow 2006; McNeill 1992, 2005). Specifically, it examines sequences of gesture and speech by L2 speakers of English in small-group, student-led discussions. Video segments were selected from a developing multimodal corpus of Chinese academic spoken English at a Sino-British university in China. It is observed that episodes of concept explanation are rich in un-elicited, imagistic gestures, some of which compensate for the limitations of the verbal messages by disfluent L2 users. An investigation of such episodes provides new insights into the relationship between gesture and concept development.

This paper takes a Cognitive Linguistic view of meaning as conceptualization, which comprises of content and construal (i.e. the structure imposed on the conceptual content), and develops dynamically over time (Langacker 1991, 2001). The construction of meaning in discourse is multimodal: the verbal interacts with the gestural, resulting in conceptualizations that are composite and non-linear (Enfield 2009).

The L2 users engaged in explanation manifest various patterns of depictive and analytical gestures (Streeck 2009) to enrich their verbal messages. Preliminary findings suggest that both the structures of these idiosyncratic gestures and their timing within a stretch of discourse contribute to the goals of synthesizing understanding in pedagogical tasks. In the first case, gesture forms elaborate meanings by adding conceptual content or shaping its construal. In one example, the speaker attempts to clarify her interlocutor's meaning of 'high brain' (in the context of discussing artificial intelligence) with a series of gesture-speech composites to develop the concept of computer programming: she uses the word 'create' and elaborates it with a 'typing' gesture. In the case of timing, gestures demonstrate a certain degree of planning (de Ruiter 2007). Gesture forms are sometimes deployed to activate aspects of conceptualizations that are reflected in the verbal discourse that follows. Gestures can also "freeze" a salient fragment of imagery throughout a segment of discourse (e.g. a hand shape of a cup is maintained while a student explains a chemistry phenomenon). Thus, verbal and visual modes share in the articulation of conceptual understanding.

The study draws on typologies of gestural construal of mental imagery (Harrison in press; Kok & Cienki 2016; Mittelberg 2014; Streeck 2009). It hopes to contribute to research at the intersection of gesture, cross-linguistic variation, and conceptualization. Overall, the interactions under analysis suggest that L2 students demonstrate an arguably high degree of complex thinking in their gestures. The impact of these gestures should not be overlooked in accounts of concept development in the L2 context.



What makes a good gesturer?

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When explaining something to someone, particularly in an asymmetrical interaction when an expert explains something to a non-expert, gestures are adapted to the partner's knowledge and are an important resource for building the explanation (Gerwing & Bavelas, 2004; Holler & Stevens, 2007; Holler & Wilkin, 2009). This is particularly true in the context of language teaching: teachers use gestures to facilitate language comprehension by the learners (Kellerman, 1992; Sueyoshi & Hardison, 2005). However, the ability to spontaneously use gestures that will facilitate understanding, is not innate, and some novice teachers have difficulty with the pedagogical use of their body (Moulin, 2004; McIntyre *et al.*, 2016). This raises several questions: (1) What makes a good gesturer? (2) What gesture features are relevant in helping a foreign language learner in understanding the language? (3) Can teachers in training improve their gestures overtime with some explicit training? (4) How can this improvement be measured?

In this talk, we will answer these questions using data from a lexical explanation task that future teachers engaged in with both a native partner and a non-native partner before and after teacher training. We will discuss the different features of their gesture production such as size, iconicity and duration of the gestures and how these changed or did not change after teacher training. Results show that although most of the future teachers changed their gestures when addressing a non-native partner both before and after teacher training, their explanations and gestures after teacher training were not necessarily improved. This raises the issue of how efficient their gestures were. We will discuss this using the data from a perception test we conducted in which participants had to watch two explanations of the same word performed by the same teacher from two different data collection points (before and after training that discussed gestures). The participants to the perception test had to rate which explanation they found the clearest and explain on what basis they made their choice. Preliminary results show that future teachers do not benefit from training the same way: some of them improve and some do not. In addition, addresses do not perceive the gestures the same way. We will conclude with suggestions for a more efficient gesture training for teachers.

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Gestures as a means to express communication acts by toddlers with typical development and toddlers with cerebral palsy

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As has been well-established by now, human communication is multi-modal, using the entire body and involving various modalities. Multi-modal communication develops from infancy. The infant develops control over different body-parts, as well as the integration between them, and uses them as parallel or complementary modality for expressing the intended communicative message. Yet the contribution of the gestural modality to the processes of communication development is relatively new. Furthermore, not much is known about multi-modal communication, and especially gesture development, in children with atypical development.

This study focuses on the use of gestures in typically developing (TD) toddlers and toddlers with cerebral palsy (CP). It aims to characterize how TD and CP toddlers use the complex system of gestures as part of the range of communicative means available to them, alongside the verbal modality, and to pinpoint the unique contribution of each communication modality to the communicative process. We developed a detailed coding scheme for analyzing the toddlers' gestures in mother-toddler interaction, addressing their function, their formal structure, the reciprocal relations between the modalities, and the ostensive cues that were used.

The toddlers' communicative acts were analyzed according to the taxonomy used by Ninio and Snow (1996). Natural interaction of the toddler and the parent in the context of symbolic play and meal-time were video-taped, transcribed and analyzed using ELAN software (Crasborn and Sloetjes, 2008). We report here on the findings of a preliminary study of 10 toddlers with TD and 1 toddler with CP, 1; 2-2: 0 years old, in the single-word phase with at least 10 words used in communication.

Our findings revealed several novel observations. All participants used a variety of gesture-types, and used various means to express the same communication act. Toddlers' co-speech gestures were expressed not only by the hands but also by motor behaviors such as: jumps, leg thrusts, head movements and rhythmic body movements from side to side. These movements are not used referentially, but rather they express a more general sense of positive or negative stance. The toddler with CP (1;4 years) with no speech, very few vocal expressions, and significant motor disability, was able, through gestures, to express a variety of communication acts and thus was an active partner in the interaction.

In addition to its theoretical contribution to our understanding of the role of the gestural modality in language development in both TD and CP children, the study has also important clinical implications, providing a scientific basis for constructing evaluation tools to detect atypical development of gestures by infants with disabilities, and to develop an effective intervention approach based on the uniqueness of each communication modality as a means of optimal development.



Exploring insights from gesture into young children's scientific thinking

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There has been a recent push for promoting science in early years education (e.g. Tippett & Milford, 2017). However, identifying the best tools and pedagogy can often be challenging, as it can be difficult to assess children's level of understanding and how this develops over time (Tolmie, Ghazali-Mohammed & Morris, 2016). Gesture has been shown to both illustrate children's understanding of phenomena (Sauter, Uttal, Alman, Goldin-Meadow & Levine, 2012) as well as their readiness to learn (Alibali & Goldin-Meadow, 1993). Furthermore, gesture is an integral part of gathering meaning from, and structuring, our environment (Streeck, 2009), and it is therefore likely to be a fundamental aspect of children's developing scientific reasoning. Gesture may also offer an important window into the thought processes of children, particularly those who cannot yet articulate themselves. Despite this, there is a relative lack of research exploring gesture in early years children's science communication.

As part of an ongoing international project exploring the role of meaningful action in early science learning we invited children from diverse backgrounds (aged 3-6 years) to talk about their ideas relating to different science concepts and engage with various representations of these (e.g. cartoons, objects, museum exhibits). Concepts covered a range of topics such as forces and biodiversity. The study aimed to identify the ways children use gesture to communicate science ideas, examine similarities and differences, and explore the role of gesture in providing insights into their science thinking. We were interested in exploring the possibility of identifying features of gestures which might be universally related to children's thinking about science ideas. For example, gestures associated with 'friction' may always contain a similar motion element, however could be expressed at different scales, with different speed and using different body parts.

Speech and gesture were systematically analysed to explore questions including:

- 1) Are some aspects of gestures universally related to particular science concepts?
- 2) How do speech and gesture complement or enhance each other, during children's process of forming ideas relating to science concepts?
- 3) Does the relationship between speech and gesture change with age, scientific language proficiency or other factors?
- 4) Are there cultural differences in use (e.g. frequency, form or position) of gestures?

Findings relating to these questions will be discussed in terms of *(i)* methodological approaches to accessing young children's thinking, exploring the importance of using multiple modes to assess and foster children's scientific understanding; *(ii)* a basis for future research directions building on this study; and *(iii)* the potential that our new understanding of young children's gesture offers for informing the design of learning experiences (e.g. in museums) that exploit specific 'meaningful' action and/or gestures, to enhance early years science education and make it more accessible for children from diverse backgrounds.



Motivation and gesture in foreign and second language development: A mixed methods study of Chinese learners of English

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This mixed methods study investigated second language learners' motivational dispositions as connected with goal-directed activity and as associated with co-speech gesture awareness and use. Four groups of Chinese learners of English in both foreign language (FL) and second language (SL) contexts of educational exposure were included. The first FL group consisted of college students at a secondary college in China and the second FL group in China was from a private English language school preparing to study abroad in the U.S. Participants in the first SL group were living and studying at U.S. universities while the second group consisted of students who had returned to China after completing their study abroad experience in the U.S., but continuing to use English for academic purposes.

We employed three forms of data collection: 1) both a motivation and a gesture survey which focused on co-speech gesture awareness and use in general and as considered within first and second language contexts specifically; 2) two video tapped discourse tasks (narrative and descriptive) aimed at capturing co-speech gesture, participants undertaking one in English and the other in Mandarin; and 3) semi-structured interviews with participants from each of the four groups, two at a relatively high and two at a relatively low level of English proficiency as established through standardized tests prior to the study.

Survey data were subject to examinations of relationships within groups and differences across groups. We examined competing latent structures of the data in a general population sample of 662 FL and SL learners of English from the surveys and investigated the invariance of the retained model across four groups based on exploratory structural equation modeling (ESEM) methods. The discourse tasks provided empirical evidence of American and Chinese gesture production as analyzed via ELAN (Version 5.0). The semi-structured interviews with 16 participants provided individual participant understanding of gesture awareness and use and their reflection of specific gestures in discourse tasks and as related to motivation. Overall, quantitative analysis was found to add greater depth of understanding to the study when paired with qualitative findings for the survey.

Preliminary results indicate that co-speech gesture awareness and use was most present for the three groups associated with study abroad. Use of American gesture also was found to be again highest among participants in the study abroad groups. Motivational dispositions as associated with goal-directed activity affected all groups' orientation towards second/foreign language development and co-speech gesture awareness and use. Taken together, the results yield important insights into student motivation and gesture awareness and use.



Deciphering indirect messages from nonverbal behaviours in face-to-face communication

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Effective communication goes beyond understanding the surface meanings. In everyday conversation, we often need to use indirect expressions (e.g., “Your paper does have room for improvement”) as opposed to direct expressions (e.g., “Your paper is really bad”), to avoid embarrassing others. Existing studies into indirect communication have primarily focused on speech (e.g., Basnakova *et al.*, 2014) without considering the role of non-verbal behaviour (NVB). The current study aims to investigate whether people can decode indirectness in conversation solely from NVB and which NVBs are most useful.

In study 1 participants were presented with twenty short scenarios (e.g., “Your friend David just played in a football match, but he did not play well”). The participant was then asked a question (e.g., “How did I play in the match?”). The participant needed to reply either directly (e.g., “You didn’t play well.”) or indirectly (e.g., “The opponents were really good.”). Thirty-four native English speakers participated. We coded three types of NVBs: gaze aversion, facial expressions, and gesture.

In study 2, a new set of 41 participants watched the video-recorded responses from study 1 with the sound muted. They needed to judge the type of response (i.e., direct vs. indirect) based on NVB alone. Results showed that participants were able to identify both direct and indirect responses significantly above chance level ($ps < .001$). This indicates that people can indeed detect indirectness *solely* based on NVBs. We then further analysed the top 10% of accurately identified video responses in the direct ($N = 18$, mean accuracy = .87, $SD = .06$) and indirect ($N = 18$, mean accuracy = .75, $SD = .06$) conditions. From these videos, we have made observations that ‘palm-up’ interactive gestures, gaze switching, and facial expressions which involve raising of the cheek muscles were common NVBs produced during indirect responses. Head shaking was the only common NVB observed during direct responses. We are currently working on correlational and multiple regression analyses to test the predictive power of different types of NVBs in the direct and the indirect response conditions.

To replicate our current findings, we are running a new production and rating study with the same procedure, except that participants will give scripted responses rather than their own responses in the new production study. In this way, we can test the social effect of indirectness in non-verbal communication without the confounding variable of cognitive load (e.g., linguistic complexity). Judging from our preliminary analyses, the results found in study 1 and study 2 have been fully replicated. Findings from this series of studies will provide significant theoretical implications for the crucial role of NVBs in indirect communication.



Seeing the unexpected in gestures: Brain activation in response to communicatively modulated kinematics

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When communicating, gestures are modulated by the specific communicative context. For example, communicative context can modulate the velocity [1], holds [1], and movement size [2] of gestures. Previous research has shown that such kinematic modulation of communicative movements (ie. actions or gestures) signals social and semantic intentions to an observer [3]. While there is evidence for such modulations in communicative gestures, it is currently unclear how these modulations are perceived and utilized by an addressee.

Without knowledge of the actor's intention, observers have an expectation of how an act will unfold. Pantomimes, for example, draw on action knowledge to communicate about an action without the use of objects. Exaggerated kinematics breach this expectation, which may cause the intended addressee to re-evaluate the actor's underlying intention. Previous studies have shown that the premotor cortex, a core mirror system region, responds strongly to actions that do not match expectation [4], [5], as well as that the mirroring and mentalizing systems are activated when viewing socially intended actions or gestures [6], [7]. However, no studies have looked at kinematically modulated gestures.

In a previous study, we used Kinect to record the kinematics of 31 pantomimes, such as cutting paper or peeling a banana, performed in either a communicative or non-communicative context. In the current study, we showed stick-light videos (generated from the Kinect recordings) of the same pantomimes to a new set of participants and asked participants them to classify these videos as communicative or non-communicative while in an fMRI scanner. We used a mixed-effects logistic regression model to determine whether the pantomime kinematics in each video was predictive of whether it was classified as communicative or not. We used this same model to calculate the predicted probability that an act would be judged as communicative (based on participant responses, $N = 27$), and fit this as a regressor in our fMRI model to determine which brain regions showed increasing activation with increasing (perceived) communicativeness.

Behavioral results showed that kinematic modulation (ie. exaggeration) was positively associated with judging an act as being communicative. At the neural level, perceived communicativeness was positively correlated with activation in the premotor cortex, medial prefrontal cortex, and the caudate nucleus.

We interpret these findings as interplay between the mirroring and mentalizing systems, matching perceived kinematics with action expectations and using this comparison to evaluate the intention of an act. While the premotor cortex (mirroring) responds to kinematic mismatch, the caudate nucleus may be an intermediary region signaling the error, [8], ultimately leading to evaluation of social intention in the medial prefrontal cortex (mentalizing). These results further elucidate the neural underpinnings of communication, suggesting an important role for kinematics in understanding the dynamic qualities of gesture production and comprehension.

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Temporal coordination of gesture, prosody and information structure in Turkish

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Gesture and speech are temporally coordinated. But what features of speech drive this coordination? Most studies investigated the temporal coordination between gesture and prosody. However, gesture was suggested to originate from idea units being “novel departures of thought from a presupposed background” [1], i.e. the information structure (IS) of speech. IS and prosody are known to align [2], but a three-way alignment with gesture has never been systematically investigated. This study explores these alignments with gesture in Turkish.

Within the hierarchy of coordination proposed between prosodic and gestural structure (Figure 1), most studies focus on timing relationships between the smallest units. We extend this investigation to larger units. We also investigate IS-gesture relationship as part of a possible three-way alignment process (Figure 2). IS describes the salience and the organization of information in a discourse. We analyze the temporal alignment of gesture units with IS units that distinguish an element from alternatives (contrast), relate utterances to previous discourse (topic), and carry new information (focus). Based on these definitions, an alignment is expected because speech and gesture stem from “growth points” with informative goals [3]. Therefore, gesture should reflect qualities of the whole and integrate IS features due to marking “newsworthy” information within immediate discourse [4].

Our data comprises narratives from 10 monolingual Turkish speakers who watched 5 pairs of videos and recounted what they saw to a confederate listener. The design elicited different IS constructions. The recorded narratives were annotated using ToBI for prosody [5], McNeill’s guidelines for gesture [1] and the QUIS framework for IS [6].

Preliminary results show consistent gesture-prosody alignment (Figure 1), but with differences from previous studies because of the prosodic characteristics of Turkish. Apexes align with pitch accents; however, not all prosodic words have pitch accents in Turkish [7]. In such cases, they align with prosodic-word-initial tones. Unlike English [8], gesture phrases (GPs) do not align with intermediate phrases because of their relatively short duration in Turkish. Instead, they align with intonational phrases. Also, gesture units are found to align with utterances. For gesture-IS alignment, we found GPs align with not only foci but also topics. However, under time pressure caused by prosodic phrasing, the onset of the alignment shifts from preparation to stroke. Furthermore, GP alignment with contrastive topics/foci is found to be tighter compared to non-contrastive topics/foci.

These results support that prosodic and gestural structure systematically align, but with variation based on languages’ intonational characteristics. We found evidence for a gesture-IS coordination adapted according to prosodic constraints, making a three-way alignment process possible. This suggests three modalities interact with each other as they reach their surface forms, having implications for speech production models.

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What enables miming in conversation? Mimetic performance and audiovisual performability

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This study is on mimetic performance (Suzuki 1995), a type of behavior, in which someone acts something out. This type of performance is usually done using gestures. The action or utterance may be based on completed actions, or possible or fictional actions, and the way it is acted out may or may not be similar to the actual situation.

Mimetic performance has not been fully investigated. Therefore, its study can contribute to a better understanding of not only mimetic performance, but also other ways that gestures are used in conversation.

This study used videotaped conversation data, wherein people in close relationships were talking. The methodology of conversation analysis (CA) was employed for analyzing what was achieved in the individual pieces of conversation.

Figure 1 shows two sets of target lines (arrows). The first set represents a mimetic performance, whereas the second shows a different kind of utterances. The two occur in similar sequential environments and are oriented similarly. A comparison of the two shows the following findings:

- 1) Certain characteristics of objects are difficult to effectively express using body movements embedded in mimetic performance
- 2) What one expresses using mimetic performance is not the object itself, but the action related to the object

Regarding the first point, some characteristics of objects (such as color, texture, or manufacture) are difficult to express by using only body movements without linguistic description. For example, one can act out "someone driving a car" but "driving a white Mercedes" is neither easy to act out nor to understand. Thus, on the first line (arrow 1) in the figure, the speaker successfully portrayed a Japanese *yakuza* (an outlaw) with its stereotypical wording. On the next target line, however, the topic shifted to a *yakuza*'s belongings, also with stereotypical details (a jingling gold necklace, an alligator-hide bag). Thus, on the second line, the speaker did not act out the topic, but described it linguistically. The stereotypical behavior of a *yakuza* (as arrow 1) can be acted out using certain body movements, voice quality, or intonation. This attribute of objects is referred to as "audiovisual performability" in this study.

Regarding the second point, in mimetic performance, one does not act out the object itself, but an action related to the object, even though one could use gestures to act out the object itself by, for example, describing the shape, the trajectory of movement, or positional relationships. Audiovisual performability is, thus, related to whether the object can be expressed as a part of an action.

Mimetic performance has not been distinguished from gesture. This study suggests that mimetic performance is not simply an utterance accompanied by a gesture, but may be a specific procedure that leads to particular consequences.

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Velocity peaks in repeated German Sign Language (DGS) signs: A motion-capture study

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When a spoken word is repeated, the duration of the repeated word is shorter than its initial-mention counterpart (e.g., Aylett & Turk, 2006; Bell, Brenier, Gregory, Girand, & Jurafsky, 2009; Galati & Brennan, 2010; Anonymous, 2011). In a similar manner, when a co-speech gesture is repeated, the size of the repeated co-speech gesture is smaller (Galati & Brennan, 2013; Gerwing & Bavelas, 2004; Anonymous, in press). Despite theoretical disagreements on why this is so, the phenomenon, which we shall call the *Repetition Effect*, is well-documented across modalities. There is, however, very little work that documents the Repetition Effect in signs, a mode of performance that shares properties with both spoken words and co-speech gestures. Like spoken words, signs have a highly conventionalized form; meanwhile, signs are articulated manually, a property that is shared with co-speech gestures.

Until now, there are two studies that discuss Repetition Effect in signs. First, a quantitative experimental study by Hoetjes, Krahmer, & Swerts (2014) reports that repeated signs in Sign Language of the Netherlands (NGT) are shorter in duration. Second, Duarte & Gibet (2010) briefly mention the Repetition Effect in French Sign Language (FSL), where they show two cases of a lower velocity peak when a sign is repeated. Therefore, it appears that the Repetition Effect in signs may unfold into multiple dimensions. Some dimensions, such as duration, can be detected with manual annotation, as Hoetjes *et al.* (2014) have done in their study. Other dimensions, such as velocity, require motion-capture technology, which Duarte & Gibet (2010) have used to show their observational data.

This study documents the Repetition Effect in signs, providing data from German Sign Language (DGS). Native signers of DGS are asked to produce a total of 120 signs; each sign is produced three times consecutively, without an interlocutor present to avoid possible effects deriving from interaction between interlocutors (see Clark, 1981). We use Vicon Motion-Capture Technology with a set of 14 reflective markers on each arm/hand to measure the velocity of each instance of signing. We predict that the velocity peak of repeated signs will be lower than the initial signing counterpart, as Duarte & Gibet (2010) have observed. In sum, this is the first study that uses motion-capture technology in an experimental setting to model change in signing velocity as a function of repetition. The result contributes to a better understanding of sign language phonetics and/or the Repetition Effect.



“Guilty as charged”: Index finger pointing as an emblem

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Pointing is an act that frequently occurs in everyday life (Kendon, 2004; Kita, 2003, *inter alia*). Under visibility condition, inanimate objects maybe pointed at to fulfil the function of clarification (Bangerter, 2004; see also Kendon & Versante, 2003 for object individualisation). Human-to-human pointing has been found to have an interactional, discourse-oriented function; for instance, it could serve to moderate turn-taking (Mondada, 2007) or to indicate agreement during a conversation (Healy, 2012). Previous studies have shown that the act of pointing consists of various manual (and non-manual) morphology that serves an array of functions when used alongside speech.

Human-to-human pointing, however, is not a common practice in Thailand (Zlatev & Andrén, 2016). This practice is generally understood in Thai culture as impolite or taboo, similar to what Orié (2009) describes in Yoruba. Although taboo, such acts often appear in Thai online crime news reports, along with prose, which contains details concerning the crime. An image of the victim(s) pointing at the suspect(s) is often included in the report.

To investigate the phenomenon, we use Google's Tensorflow framework for machine learning. A model was trained to detect human-to-human pointing scenes, as found in the Thai news reports. This model was applied to images gathered from multiple Thai online news websites in order to identify the desired scenes. Results show that only two kinds of pointing morphology are found in this context: index palm down pointing and index palm vertical pointing (see Kendon, 2004 chapter 11 for a description of pointing morphology).

We argue that in this restricted context, human-to-human index finger pointing can be construed as a conventionalised act, an act that carries an emblematic function, synonymous with “guilty as charged” (see McNeill, 1992 for degrees of conventionalisation continuum; see Ekman & Friesen, 1972 for a definition of an emblem). Therefore, we propose that the narrative of Thai online crime news consists of two parts that should be viewed holistically: the written prose which contains factual information, and the image containing human-to-human pointing which embeds an accusation of guilt. Therefore, information is packaged multi-modally in these news reports.

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Non-signers are sensitive to verb and noun encoding in sign languages

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Human languages employ verbs and nouns to make a basic distinction between descriptions of actions vs. objects (Langacker 1987) and between the functions of predication vs. reference (Croft 2000). Prototypically, verbs predicate about actions while nouns refer to objects. Moreover, the bodily-visual modality affords the ability to iconically represent actions and objects with the movement and shape of the body and hands. In sign languages, related verbs and nouns can be distinguished in their manner of movement (Supalla & Newport 1978/AmericanSL, Johnston 2001/AustralianSL, and Tkachman & Sandler 2013/IsraeliSL) or in their iconic handshapes (Padden *et al.* 2015/AmericanSL). In order to examine the possible gestural basis for verb/noun-encoding in iconic representations of actions/objects, here we ask whether nonsigners are sensitive to representational strategies that emulate verb/noun-encoding strategies in natural sign languages, when pairing gestures with actions or objects.

It has previously been found that sign-naïve gesturers show a strong preference for representing actions with "handling" handshapes, which show a human hand in action, and a slight preference for representing objects with "instrument" handshapes, which show human manipulation of the object, an encoding strategy that also distinguishes verbs and nouns in ASL (Padden *et al.* 2015). In ASL, movement patterns also distinguish related verbs and nouns: verbs are formed with longer/continuous movements, while nouns are formed with faster/constrained movements (Supalla & Newport 1978). Here, we test whether non-signers show a movement preference for gestures representing actions and things, and test for an interaction between preferred mappings for movement and handshape (Table 1).

Using the crowd-sourcing platform Crowdfunder, we showed 1175 participants pairs of videos of iconic gestures, and asked them to identify each video as representing either an action (e.g. "using a handsaw") or object (e.g. "a handsaw"). We find that, when movement is constant across videos and handshape varies, participants tend to map handling handshapes to actions and instrument handshapes to objects (see also Verhoef *et al.* 2016). When handshape is constant across videos and movement varies, participants tend to map continuous movements to actions and constrained movements to objects. In the interaction conditions, when both handshape and movement vary between the videos, participants weight their preferences for mappings based in iconic handshapes over their preferences for mappings based on movement patterns (Figure 1).

In this perception experiment, we replicate the finding that nonsigners exhibit a handshape bias, and we identify an expected bias for movement, too. When these biases are in conflict, nonsigners overwhelmingly map forms to meanings on the basis of their handshape bias.

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“Don’t make that face!” What face? The onomasiological bottleneck in the description of facial actions in interactional contexts

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In human face-to-face communication, visible behaviors form an integrated system with speech, in which visible and audible signs are linked pragmatically, semantically, and temporally in composite utterances. While manual and postural movements, head nods and eye gazes have assumed their place in the canon of interactional resources, the role of facial action remains understudied. In part, that is because, while posture is relatively stable at the enchronic time scale, and manual, head and eye movements are relatively punctual, facial action is both continuous and continuously variable. There is no ‘rest position’. A ‘blank face’ can be crucially meaningful. Further, facial action is extremely complex: rather than being a single thing, it is itself a ‘composite utterance’ of independent articulators. Both of these features conspire to make it difficult to give descriptive names to distinct and distinctly meaningful composites, especially names which do not betray an interpretive bias. How do we describe a configuration that clearly reveals an attitude or stance without appearing read minds and attribute mental states? Clearly, much research and discussion is needed. To illustrate, we present qualitative analyses of various types of dyadic semi-spontaneous face-to-face interactions among native speakers of Brazilian Portuguese. Using ELAN, the conversations are transcribed in their multimodality. We code for manual gestures, eye gaze, head and shoulder movement, and body posture for both participants. For facial actions, we code for changes in eyebrow, eyelid, and mouth. The analyses show that facial actions allow coparticipants to ongoingly demonstrate their understandings of and attitudes toward one another's actions; that facial actions can be taken as anticipations of, for example, disagreements that are in the process of developing; and that speakers appear to consider coparticipant actions in producing current and subsequent utterances. We observe, however, a disconnect between our codings and our descriptions of what seems to be happening. Codings for, say, the mouth, do not translate directly, alone or together with codings of other articulators, into vernacular descriptions such as ‘sneer’ or ‘scowl’, much less to more subtle descriptions which pick out, in a single gestalt, notes of rejection, disbelief and wonderment. Yet those are the readings speakers, coparticipants, and researchers alike are expert in making and which inform their actions. While we are confident our data show the influence of facial action on the course of conversation, our demonstrations and arguments suffer from the lack of a common vocabulary for describing the phenomena objectively. It is perhaps only by stimulating the sharing of findings on facial action in interaction that a consensus will emerge on how they can best be described and discussed.

Multimodal vagueness as a politeness strategy

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As extensively showed in the literature on vague language (VL), ordinary language leaves room for people to be vague, avoid precision and the commitment associated with it (Prince *et al.* 1982; Channell 1994; Cutting 2007; Overstreet 2011; Voghera 2013). Speakers keep themselves under the precision threshold (i.e. they are vague in their communication) either because they lack knowledge on the topic – they are incapable of providing more details (lack of knowledge to be precise), or because they are unwilling to be precise (lack of goal to be precise). In the latter case, depending on whether the speaker chooses to withhold information to protect himself or the interlocutor, Poggi & Vincze (2012) distinguish between altruistic and selfish goals of vagueness.

The present work focuses on the multimodal communication of purposive vagueness (no goal to be precise) at the intersection between altruistic and selfish goals. On the wake of Trappes-Lomax (2007), I focus on VL as a tool for expressing politeness: protecting the face of the hearer (Brown and Levinson 1987), i.e. an altruistic goal, while at the same time protecting the self - a defensive strategy and a selfish goal.

To analyse the gestures speakers make when there would be more to tell, but they are unwilling to do so, I designed an experiment where 25 students in Education Sciences, 23 females and 2 males, between 20 and 30, were videorecorded while telling a dream to their interlocutor (a professor or a researcher). A total of 25 fragments of dream telling were collected, consisting of approximately 5 minutes each. In these fragments both types of vagueness were encountered: (1) vagueness due to lack of knowledge (as students had to narrate a dream they vaguely remembered); and (2) vagueness due to lack of goal to be precise (as sometimes students, although had the knowledge, lacked the goal to tell, and tried to avoid, by means of VL, both interpersonal and personal trouble (i.e. threats to the face of the Hearer, and threats to the face of the Speaker, respectively).

When entering an asymmetric relationship where the interlocutor has more power than the speaker, an outcome speakers want to avoid is causing negative emotions in the listener (such as sadness, fear, irritation). Hence, sensitive topics are only hinted at, both linguistically and multimodally. In terms of gesture, a conscious choice of being vague to avoid trouble is characterized by rapid and tensed hand rotations. In fact, when deciding whether to tackle unpleasant information, the Speaker makes a conscious choice which eventually may lead not to mention certain things (lack of goal to be precise).

Speakers' multimodal behaviour while being purposively vague will be analyzed and compared to speakers' multimodal behaviour in contexts where they have no knowledge on the topic (and hence have no choice but be vague). Differences in gesture parameters will be singled out in the two contexts, with a particular focus on the purposive vagueness.

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Speech + gesture combinations in infants' language socialisation across cultures

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Speech + gesture combinations allow children to express a two-word idea before they may be able to express such ideas fully in the spoken modality (Butcher & Goldin-Meadow, 2000). The onset of using speech + gesture combinations that convey compositional information (e.g., “drink” + point-at-glass) seems to predict the onset of two-word utterances (Goldin-Meadow, 2009; Iverson & Goldin-Meadow, 2005). This relation has been observed for all cultures studied so far (Iverson *et al.*, 2008), and thus could be an important milestone in children's language development. However, little –if nothing– is known about the use of speech + gesture combinations in non-industrialised societies where infant's language socialisation, including the use of gestures, differs considerably from industrialised societies (LeVine *et al.*, 1994; Zukow-Goldrin, 1996). In this research, we investigate to what extent the emergence of speech + gesture combinations varies between an industrialised, Western culture and a non-industrialised, sub-Saharan African culture.

We analysed natural observations of 40 18-months-old infants from middle-class families in the Netherlands and from low SES families in rural and urban Mozambique. In particular, we explored cultural differences in the speech + gesture combinations addressed to and produced by the infants. We analysed whether the gestures were semantically coherent with the verbal utterances, and for those utterances that were, to what extent the information conveyed in gesture and speech were complementary to each other (e.g. point-at-apple and say "eat") as opposed to conveying the same information (e.g., point-at-apple and say “apple”).

We found that the speech + gesture combinations addressed to infants in the Netherlands were more often semantically coherent compared to those addressed to Mozambican infants. However, caregivers in rural Mozambique produced the highest proportion of complimentary speech + gesture combinations, followed by urban Mozambique and then the Netherlands. For infants' productions, we excluded data from rural Mozambique, since these infants hardly produced any intelligible speech. We found that in the Netherlands, infants produced more speech + gesture combinations, but the proportion of semantically coherent combinations was higher for urban Mozambican infants. Moreover, proportionally speaking urban Mozambican infants produced many more complimentary speech + gesture combinations than Dutch infants.

To conclude, complimentary speech + gesture combinations seem to occur relatively more frequent in both input and of infants in Mozambique compared to the Netherlands. These findings suggest that such combinations may emerge earlier in Mozambique than in the Netherlands. If this is, indeed, the case, we would expect that based on Butcher and Goldin-Meadow (2000), the onset of two word utterances occur earlier in Mozambique than in the Netherlands. Whether that is the case remains a question for future research.



Does self-touching attract more visual attention than gesticulation? An eye-tracking study

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Self-touching behaviors – such as scratching one’s cheek or rubbing one’s nose – are typically accounted for in terms of self-regulation, such as coping with negative affect (e.g. Ekman and Friesen 1969) or disruptions of attention (e.g.), but there are also lines of research indicating that self-touching plays a supportive role in the dynamics of face-to-face interaction. Although self-touching behaviors are extremely common in face-to-face interaction, little is known about the degree to which they attract visual attention. Here, we report the first study addressing the question of allocation of visual attention to self-touching and gesticulation with eye-tracking technology.

In obtaining our stimulus, we used a standard “cartoon narration” procedure developed by McNeill (e.g. McNeill *et al.*, 2008): a 23-year-old male actor was shown a short, animated cartoon and was then asked to narrate this story to the camera. The actor had been trained to perform self-touches—specifically, to scratch the lower torso or one of the arms—and had been instructed to use these movements throughout the recording. Previous research (Harrigan *et al.*, 1986) found the ratings of spontaneous and posed self-touches to be sufficiently similar for the latter to be used as valid stimulus; we also ran an additional validation procedure to verify that the posed movements in our material looked sufficiently natural. The total length of the recording was 7 minutes 27 seconds, and 25 self-touches and 58 gesticulations were identified. All of the 25 identified self-touches were discrete, i.e. lasted less than 3 seconds (Freedman, 1972).

31 participants watched the video of the actor, and we used eyetracking data from 27 participants (4 datasets were excluded on technical grounds): 19 women (aged $M = 22.5$, $SD = 2.3$) and 8 men (aged $M = 25.5$, $SD = 3.2$), all of them were students of Psychology at the *** University in ***, ***. We compared the proportion of visual attention allocated to self-touches, gesticulations and the face, measured in terms of relative dwell time and average fixation duration. While the face was the most fixated area, self-touching activity attracted significantly more attention than gesticulations (*relative dwell time*: self-touches = 8.34%, face = 72.29%, gesticulations = 2.26%; *mean fixation duration*: self-touches = 435.71 ms, face = 556.96 ms, gesticulations = 274.51 ms). In conclusion, we discuss the limitations of our design (single actor, posed stimulus, non-interactive design) and offer several interpretations of our result, including those underscoring the informative-interactive potential of self-touches.



The relationship between pointing and language development in monolingual and bilingual infants

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In recent years, psychologists have identified an association between infant gesture and spoken language acquisition. Gesture predicts oncoming changes in spoken language acquisition in infants (Rowe & Goldin-Meadow, 2009; Goldin-Meadow & Butcher, 2003; Iverson & Goldin-Meadow, 2005; Iverson *et al.* 2008). One mechanism by which gesture leads to speech development is thought to be parental labelling, with parents responding to infant points by providing a spoken label for the referent (Goldin-Meadow, Goodrich, Sauer, & Iverson, 2007). Colonesi *et al.* (2010) published a meta-analysis of 25 studies that examined the association between pointing and language. Of these, 12 had considered the concurrent association between pointing and language, and this was found to be strong ($r = .52$). The longitudinal association was assessed by 18 studies and this was reported to be medium ($r = .35$). The strength of the association was found to be moderated by age, with the largest effect sizes observed when pointing was measured when infants were 15 months and older. The majority of the studies included US and UK samples ($n = 16$), with the remainder being European ($n = 8$). Only one study was drawn from a non-western sample. In this study of Japanese infants, no association was found between infant pointing and language (Blake *et al.* 2003). This raises the question of whether the association between pointing and language transcends cultures and languages. Furthermore, none of the studies in the Colonesi review included samples of bilingual infants. In the light of this, we will conduct a meta-analysis to systematically examine whether bilingual infants demonstrate robust associations between pointing and language across both their languages, or whether this varies depending on the typology of language that they are learning. Specifically, we address two core research questions: (1) What is the strength of the relationship between pointing and language development in monolingual or bilingual infants? (2) Is this association universal across languages or is it language specific? The focus of this work has significant societal impact. Indeed, more than half of the world's population is bilingual, 20% of the US population is bilingual (US Census Bureau, 2007) and more than half of the EU population is bi/multilingual. Additionally, in the UK, bilingual pupils represent 17.5% of primary pupils in England (SFR, 2012), and this proportion is increasing by approximately 1% per annum (Chalmers *et al.*, 2014). Bilingual children have weaker literacy skills and some studies suggest that they have smaller vocabularies than their monolingual peers (Bialystok, 2002; Bialystock, Luk, Peets, & Yang, 2010). Thus, it is important to understand the pathways to language acquisition in bilingual infants.



The nature of L1 & L2 phonological representations in a signed language: 3D or orientation-specific?

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Acquiring a signed language involves learning in a visuospatial modality in which three-dimensional signs are seen and processed from many different visual angles. For acquisition of a signed L1 or M2-L2 (i.e. L2 learning in a second modality), exposure to varied viewpoints is likely different. While L1 signers are exposed to diverse viewpoints during child-directed signing (e.g., face-to-face, looking up at adults from their lap or arms) as well as watching dialogues and group discussions from side angles, M2-L2 learners receive mostly front-view input (e.g., from a teacher at the front of class, or from 2D resources such as books and videos).

We hypothesised that differences in frequency and type of exposure to multiple orientations of the same sign might affect whether phonological representations of signs are visually ‘orientation-specific’ or instead, easily ‘rotatable’. Orientation specificity may be analogous to specificity effects for indexical features of spoken language representations, e.g., distorted or accented speech, or speaker identity change. There is some evidence for orientation-specific priming in sign/gesture discrimination [1]. Critically, here we test whether orientation-specificity holds during linguistic processing of British Sign Language (BSL). Furthermore, we ask whether there are differences between hearing vs. Deaf L1 acquisition; L1 vs. M2-L2 acquisition and fluent vs. intermediate M2-L2 proficiency.

BSL signers who are Deaf L1 ($n=12$), hearing L1 ($n=12$), fluent hearing M2-L2 signers ($n=12$), and intermediate hearing M2-L2 learners ($n=12$) performed a semantic decision task (is it edible/living?) in a distance priming paradigm, where prime and target are separated by many intervening trials. BSL signs ($n=240$) were presented twice from five possible visual angles (Figure 1), once as prime and once as target (3 conditions: no change, 45° change, 90° change). We predicted that M2-L2 signers would show faster RTs and better accuracy the smaller the degree of change between prime and target, indicating orientation-specific representations. For L1 signers we predicted a repetition priming effect regardless of the change in visual angle, indicating more ‘rotatable,’ orientation-independent representations. Participants also performed mental rotation and BSL ability tasks to test for correlations.

Preliminary results suggest intermediate M2-L2 learners benefit in accuracy when seeing difficult angles twice, and in speed when an easier angle is shown at second presentation. This suggests earlier exposure to ‘harder’ angles may improve M2-L2 learning. For L1 Deaf signers, orientation change at second presentation is irrelevant for accurate comprehension. Mental rotation skill correlated highly with L1 Deaf (but not M2-L2) performance on the BSL task, suggesting native comprehension may be achieved via mental rotation of sign representations. Testing on the two groups of fluent hearing signers (L1 native & M2-L2 fluent) is almost complete and will clarify whether differences seen arise due to deafness, late acquisition or incomplete acquisition.

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From washing to rejection: The development of a Hausa gesture of negation

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Co-verbal gestures of negation, i.e. gestures that accompany verbal negation has attracted the attention of a scholars (Harrison 2010, 2009; Calbris 2011). Some of the gestures seem to be quite universal and function across languages and cultures. An example is the head shake or a gesture in which the palm facing downwards is moved horizontally away from the mid-line of one's body (Kendon 2004: 263). Other gestures, such as chin flick (Morris, *et al.* 1979) have more limited use. One of such gestures, which seems to be used only in northern Nigeria is brushing the back of the hands in two downward movements. It is used as a co-speech gesture by the Hausa speakers. It often accompanies statements containing negative markers or inherent negation.

I would argue that the gesture has derived from an action of washing back of the hands from the ankle to the tips of the finger repeated during every ablution performed by Muslims before the prayer. There are two arguments supporting such a hypothesis. First, there's a semiotic link between the meaning of the gesture and the reason of performing ablution. The ablution purifies the body before the prayer, helps to get rid of any dirt. The gesture expresses getting rid of something undesired, getting rid of "a mental dirt". Thus, when performing the gesture speakers tend to utter the phrases like: "I didn't do it", "it's not my fault", "it's not my business", "I stopped doing it", "I resigned". The second argument supporting the hypothesis are few instances where the gestures accompany the utterance referring to the action of washing and cleaning.

In collecting the data, I follow the method adopted by Antas (2013:10) and rely on pieces of natural discourse, which were not recorded with the intention to study gestures. Such a method has its shortcomings (Will 2016:186), but results in obtaining various verbal contexts of the gesture. The data were collected between 2010-2017. Some videos are interviews with Bayero University Kano staff members and concern various organizations of Islam in Nigeria. Other videos, obtained via YouTube, consist of sermons preached by most popular Nigerian sheikhs. The language of all the videos is Hausa.

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What pedagogical gesture teaches us about how social context influences gesture production

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Previous literature on gesture has demonstrated its communicative value (e.g. Bavelas, Kenwood, Johnson & Phillips, 2002; see Hostetter, 2011). Further, research has shown that speakers will design their gesture production in relation to the perceived needs (Kelly, Byrne & Holler, 2011; [author], 2012), shared knowledge (e.g. Holler & Wilken, 2009), and communicative behavior of their audience or interlocutors (e.g. Bergmann & Kopp 2012; Kimbara, 2006, 2008). These studies have been typically conducted in experimental conditions. In which naturally occurring contexts do we see audience-sensitive gestures develop to play a critical role in communication? One such context is classroom teaching (Moulin, 2004; [author], 2014). A teacher's responsibility to communicate with learners encourages a more conscious and stylized multimodal effort that becomes, with reflection and experience, an acquired professional practice. The foreign language immersive pedagogical context in particular requires a more conscious use of gesture (among other multimodal resources) as participants cannot easily rely on speech. This context can be compared to other conditions in which gesture becomes a more critical modality, such as when there is ambient noise (Meissner & Philpott, 1975), topical stigma (Brookes, 2011) or religious or ritual expectations (Kendon, 1988, 1990b). In these contexts, processes of stylization and conventionalization of co-speech gesture become apparent.

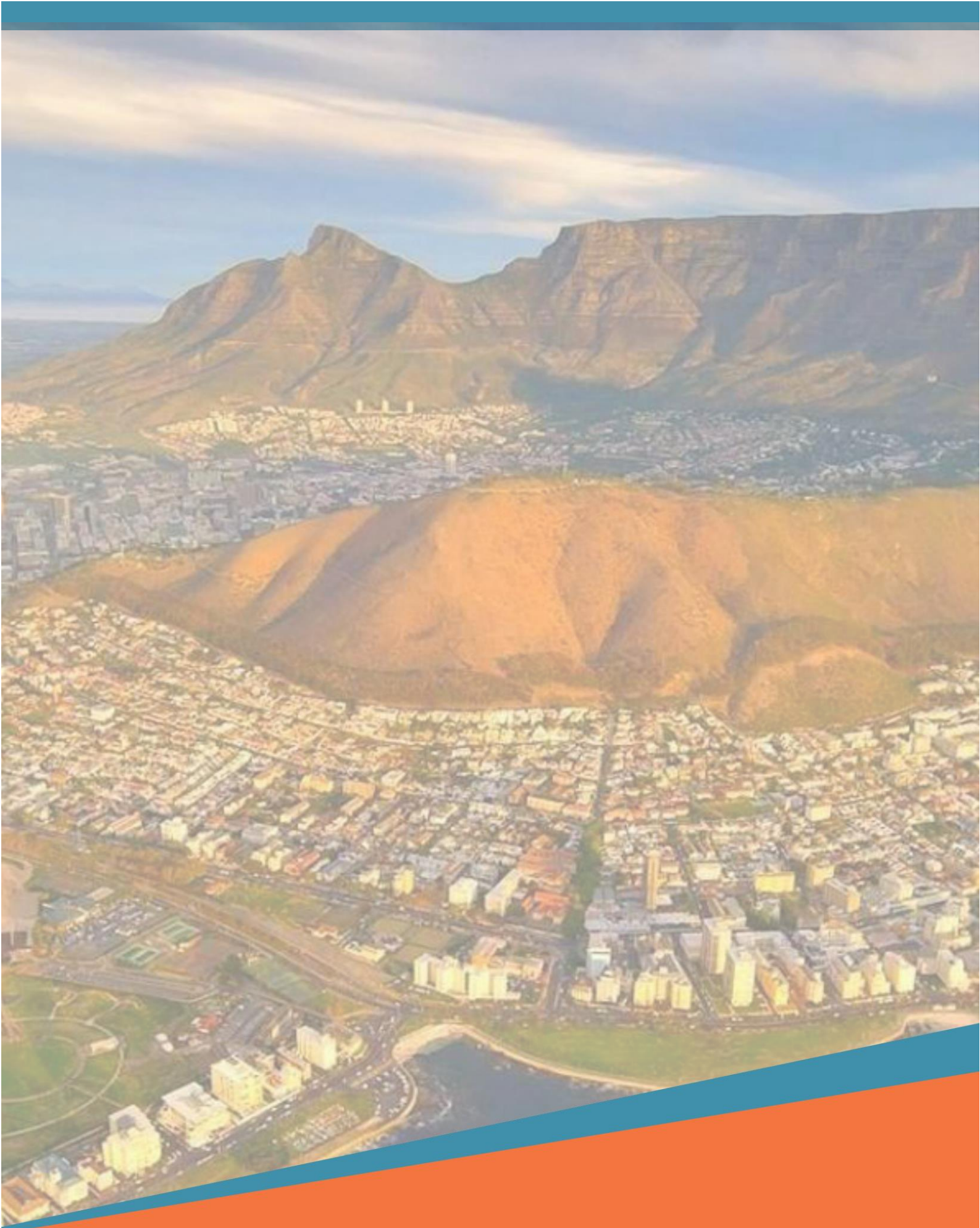
This paper draws from several corpora of video-recorded data collected between 2012 and 2018 in two language teacher-education MA programs, one in the US (English language data) and one in France (French language data), to demonstrate that distinct changes occur in how these teachers use gesture during their educational experiences in the program. Their gestures become more audience-designed, more performative, and in some cases, more codified than they were initially. We identify several contextual factors and gestural properties that, taken together, distinguish what we call here 'pedagogical gesture'. These include greater role asymmetry in the interaction, greater pedagogical intention, increased gestural awareness, increased gesture iconicity and visibility (e.g. size and duration of gesture), elements of conventionalization, as well as less dependence on speech. These gradient properties are compared and contrasted with those of non-pedagogical co-speech gesture and contexts. This research contributes to understanding the natural social contexts and conditions in which gesture is used with communicative intent, as well as how specific social contexts promote the development of shared gestural properties and practices across countries and languages within a professional field.

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Poster Presentations

How language & culture shape gesture in Arabic and English speakers: A cross-cultural study

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People from different backgrounds gesture differently. Their gestures differ in terms of features such as the 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 & Essegbey 2001) and the semantic and grammatical spoken language structure (Kita & 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 study investigates the cross-cultural differences between representational gestures produced by British speakers of English and Saudi speakers of Arabic regarding certain features; use of gesture space, gesture rate and dual gestures. 16 British speakers of English and 16 Saudi speakers of Arabic described the actions performed by the characters playing in 10 small movie clips of the Tomato Man and the Green Man (Özyürek, Allen, & Kita, 2001; Özyürek, *et al.*, 2007, Kita, *et al.*, 2008). Quantitative as well as Qualitative analysis of the data revealed the following results. I found that the Arabic speakers used significantly bigger gesture space than the gesture space used by the English speakers. The Arabic speakers also used more representational gestures per 100 words than those produced by the English speakers. These findings are to an extent similar to how the Neapolitans' speech-accompanying gestures are like in the study conducted by Kendon (2004). Moreover, the Arabic speakers produced significantly more dual gestures than those produced by the English speakers. These cross-cultural differences are discussed in respect to linguistic and cultural aspects that might have caused them such as Whorfian effect and ecological and historical backgrounds.

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Gesturing vs. tapping: The effect of different types of hand movements on metaphor processing

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Research suggests that production of co-speech gestures as opposed to gesture inhibition increases the amount of spatial metaphors in speech (Bos & Cienki, 2011). In addition, co-speech gestures with a particular hand influence cognitive processes involving the hemisphere contra-lateral to the gesturing hand. For example, gesturing with the left—but not the right—hand compared to not gesturing enhances metaphor explanation, which involves the right hemisphere (i.e. Hand-Specificity Hypothesis for gestures' self-oriented functions) (Argyriou, Kita & Mohr, 2017). These findings suggest that gesture production promotes activation of spatio-motoric representations (Kita, Alibali & Chu, 2017). However, it is not clear yet whether gestures—in particular left-hand gestures—demonstrate this beneficial effect on metaphor processing because of their motoric properties or their depictive nature (i.e. their ability to represent meaning). Moreover, it is unclear whether the observed gestural benefit relates to all types of metaphor processing (e.g., metaphor explanation and spontaneous use of metaphors).

In this study, we investigated whether meaningful gestures with the left-hand as opposed to meaningless tapping movements can trigger spontaneous use of metaphors. Tapping movements facilitate tasks relying on automatic spread of activation (e.g., tip-of-the tongue state), but they do not facilitate tasks that depend on speakers' ability to search the lexicon strategically (e.g., letter fluency task) (Ravizza, 2003). Spontaneous production of metaphors requires a strategic search in the lexicon, because it requires activating and relating shared semantic information between remotely associated concepts (Benedek *et al.*, 2014). Therefore, we hypothesised that, compared to tapping movements, gestures, and in particular left-hand gestures, would increase the likelihood of using metaphorical language because of their depictive nature rather than their motoric properties.

Right-handers ($N = 60$) orally explained English phrases with abstract meaning (e.g., 'to forgive'). Half of the participants were instructed to gesture with the left hand, the right hand and to not gesture at all. The other half were instructed to tap their left hand, the right hand and to not tap at all. We coded the explanations for spontaneous use of metaphors (e.g., the explanation 'to forgive means to not *hold a grudge, to move on* and forget someone did something to you' was coded as metaphoric; the explanation 'to forgive is when someone admits they are sorry and you accept the apology' was coded as non-metaphoric). We found no strong evidence that the type of hand movement and the hand used affected spontaneous use of metaphors (i.e. likelihood of metaphorical language use was comparable across conditions). Cautious interpretation of the findings raised new questions. For example, is a tapping movement truly meaningless? In addition, could it be that left-hand gestures enhance metaphor processing when the right hemisphere is already activated (i.e. when speakers explain metaphorical phrases and map literal concepts to abstract meanings as demonstrated in Argyriou *et al.*, 2017), but not when metaphorical thinking needs to be triggered (i.e. when speakers explain abstract phrases and spontaneously use metaphors)? We will discuss recommendations for further research to investigate a possible 'hand-and-task-specificity' hypothesis for gestures' self-oriented functions.



Do ironic moms talk with their hands a lot? Co-speech gestures accompanying ironic comments directed to young children

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Research shows that speakers often rely on gesture when producing or understanding figurative language, for instance irony. Spontaneous ironic speech triggers more gestures in conversations among friends than neutral, non-ironic speech (e.g. Argyriou & Kita, 2013; Attardo *et al.* 2003; Gonzalez Fuente *et al.*, 2015). Gestures accompanying the speech are known to ease the speaker's cognitive load and are used for decoding of the meaning of ambiguous sentences (Guellai, Langus & Nespors, 2002). There are various theories that try to justify this phenomenon. According to the Image Maintenance Hypothesis, gestures help the working memory to maintain mental imagery during speech production. Information Packaging Hypothesis claims that gestures help speakers at the conceptualization level.

However, even though there is an increasing body of research of figurative speech comprehension by very young children (e.g. Banasik, 2013, Recchia *et al.*, 2010; Wilson; 2013), there is little work on if and how gesture is a significant cue not only for mature communicators, but also for very young children, who are still in the process of developing their communicative and pragmatic competencies.

In the project presented, I looked at early mother-child interactions and while annotating instances of ironic speech directed to child, I took note and later analyzed the co-speech gestures accompanying the figurative language used. In order to do that, 120 hours of recordings that included mother-child interactions of six children aged 0;11 - 3;05, available through the CHILDES – Providence Data (Demuth *et al.*, 2006) were analyzed. Preliminary results suggest that either a co-speech gesture or a characteristic prosodic cue accompanies the production of an ironic comment directed to a child.



Baby Sign, mind-mindedness and language development

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Baby sign—a set of gestures symbolising words such as ‘milk’ and ‘tired’ taught to hearing babies—is an increasingly popular activity amongst parents and their pre-verbal infants in the UK. Companies promoting baby sign make many claims about its benefits, including improving language development, decreasing frustration and enhancing parent-child bonding. These are big claims, but it is unclear that baby sign works, and, if it does, how it works.

One mechanism by which baby sign might improve language development is through enhancing mother-child interactions. If using baby sign changes how mothers perceive their infants, such that they view their child as capable of intentional communication at an earlier age, we would expect baby-signing mothers to be more likely to acknowledge their child’s deictic gestures (e.g. points, reaches), and to provide more mental-state terms in response to these gestures, than non-signing mothers. While current research on the impact of baby sign is limited, some positive effects on maternal responsiveness and attunement have been found (e.g. Góngora & Farkas, 2009; Vallotton, 2012; Kirk *et al.*, 2013). In addition, research suggests that infants’ gestures elicit mental-state terms from mothers (Olson & Masur, 2011), and that mothers use more mental-state labelling (e.g. *want*, *like*) when they see their children as volitional agents (Slaughter *et al.*, 2008).

Bringing this research together, we investigate (1) whether baby-signing mothers are more likely to respond to deictic gestures (e.g. points, reaches) than non-signing mothers, (2) whether baby-signing mothers are more likely to respond to those gestures using mental state terms (e.g. *want*, *like*) than non-signing mothers, and (3) what impact maternal responsiveness and use of mental-state terms have on children’s vocabulary development.

Participants were drawn from a longitudinal project following language and communicative development over the first five years of life ($N = 46$, half of whom were baby-signers). At 11 and 12 months of age, mother-child dyads were filmed looking at interesting objects and playing with toys (e.g. Cameron-Faulkner *et al.*, 2015) for 23 minutes at each time point. Interactions were coded for infants’ deictic gestures (e.g. points, reaches) and maternal responses to these gestures. Note that baby signs produced by the infants were not included in the analyses.

Initial analyses on 5-minute samples suggest that baby-signing and non-signing mothers do not differ in their responses to infants’ deictic gestures in either rate or content of responses. However, baby-signing babies produce slightly more of these gestures than their non-signing peers. Over time, this may give baby-signers more opportunities to hear contingent utterances from which they can learn. To test whether this is the case, we will present findings from the full 46 minutes of interaction. We will also test whether baby-signing and/or maternal responsiveness relate to vocabulary development over the 18 months of life.

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Investigating emotional-cognitive development through gestures

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Within Vygotskian Sociocultural Theory of Mind (SCT) for second language (L2) studies, there has been a recent call to investigate learners' emotional development in addition to their cognitive development (see for example Swain, 2013). From an SCT perspective, cognitive development can be, and has been, traced through studying "how human social and mental activity is organized through culturally-constructed artifacts" (Lantolf, 2000, p. 1). To achieve this, we must study its genesis or history, using verbal and bodily means as evidence. According to Mesquita (2012), studying emotional development also requires a "historical study of phenomena." What is essential though is that we need to "examine the relationship between intellect and affection." In fact, it is through investigating the history/genesis of how L2 learners understand, use, and internalize culturally-constructed artifacts, as evidenced through verbal and bodily means, that we can see the dialectical relationship between emotion and cognition and trace learners' emotional-cognitive development. This study investigated two groups of four intermediate university-level L1 English L2 French learners' emotional-cognitive development of literacy. The Concept-Based Instruction (CBI) on narrative literacy aimed to develop learners' understanding, use, and internalization of the concepts of Foundation, Organization, and Genre. A Division-of-Labor Pedagogy (DOLP) was also implemented so that these three concepts could be divided into their component parts. At the outset, each learner was only responsible for one component part at a time, however through the division of labor, learners were able to share their work so that they could all participate fully in the literacy activities. Mediation was provided to each learner and the group as needed. The data for this semester-long study included audio-video recordings, which were then transcribed, learners' verbalization data, written summaries for each text including the pre- and post-test, and survey data. Learners' emotional-cognitive development was traced through the use of gestures, gaze, body posture, facial expressions, private speech, speech rate, pausing, laughter, latching, soft speech, and their verbal expression. For this talk, I will focus specifically on how gestures, gaze, and body posture linked with verbal expression allowed us to trace learners' emotional-cognitive development and select learners' development will be presented.



Individual variation in gesture comprehension: The role of empathy

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Why do people differ with respect to the amount of information they obtain from gesture? Existing studies on gesture comprehension posit a role for individual differences, such as age and information type encoded in gesture, in the communicative value of gesture (Hostetter, 2011). In addition, a recent study suggests that individual differences in gestural sensitivity, as measured via a brief, subjective self-rating scale, are associated with individual differences in social and empathic functioning (Brief Assessment of Gesture; Nagels *et al.*, 2015). We are interested in the experimental investigation of the relationship between gesture comprehension and aspects of social cognition.

In this study, we investigated whether the ability to empathise with others is an important construct governing gesture comprehension. We used a task of multimodal integration (adapted from Cocks, Morgan & Kita, 2011). Participants were presented with either a spoken sentence (e.g., a still image of an actor uttering the phrase ‘I throw’) or an iconic gesture (e.g., a video clip of an actor producing a throwing gesture with two hands while sound was muted) or an audio-visual combination of the two. Their task was to select a photograph that best corresponded to the meaning conveyed. There were four options: integrated match; gesture only match; speech only match; unrelated foil. Participants also completed an empathy questionnaire (Baron-Cohen, & Wheelwright, 2004). Preliminary findings show that performance is better in the two unimodal conditions than the audio-visual combination (validating the task used and being in line with previous research; Cocks, *et al.*, 2011; Sekine, Sowden & Kita, 2015). Crucial to our research aim, we focused on the occasions when speech-gesture integration failed and we performed an error analysis. We found that participants who put more weight on gestural than verbal information in the audio-visual condition (i.e. participants who selected the gesture only option more often than the speech only option) also showed higher empathy levels. These findings indicate that, at least when speech-gesture integration fails, people’s ability to attend to and obtain information from gesture may relate to their ability to empathise with others. Potential practical implications include interventions in clinical and educational settings (e.g., empathy training to enhance gesture comprehension). We will discuss recommendations for further research to establish a clear link between empathy and gesture comprehension.



When gestures affect syntactic structures: A case of postposed construction in Japanese conversation

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In this paper, we investigate a close relationship between gesture and language, focusing on a case where the syntactic structure of an utterance in conversation is influenced by production of a gesture. In particular, we demonstrate how postposed construction in Japanese, in which an argument/modifier of the predicate is postposed, contrary to the canonical word order of ‘Argument/Modifier-Predicate’, is driven by a gesture accompanying the predicate in a situated way.

Postposed construction is frequently observed in spoken Japanese, and has been studied from various viewpoints such as afterthought, information structure, and interactional preference (e.g., Kuno, 1978; Ono & Suzuki, 1992; Takami, 1995; Tanaka, 2005). However, none has discussed postposed construction from the view point of accompanying gesture.

Along with the *growth point* theory, it has been shown that gestures frequently accompany verbs and onomatopoeias (e.g., McNeill, 1992; Kita, 1997). In Excerpt 1, for instance, the mother’s utterance *ton nai to chanto*: ‘if you don’t catch the ball correctly’, in line 02 is accompanied by a gesture of catching a ball (see Figure 1). The stroke of the CATCH-A-BALL gesture is precisely coordinated with the production of *ton*, an inflected form of verb *toru*, ‘catch’.

Interestingly, this mother’s utterance involves postposed construction; the adverb *chanto*, ‘correctly’, modifying the verb *ton* is postposed. (Note that in the canonical word order of Japanese, an adverb comes before the verb it modifies.) It seems that the production of the CATCH-A-BALL gesture pulls the verb *ton* earlier in the syntactic structure, thereby yielding a postposed construction.

Then, why is the CATCH-A-BALL gesture produced at that moment? To answer this question, let us see the excerpt more closely. In this excerpt, the mother (Mo) is watching her elder son (ES) playing baseball with his father and younger brother; the father acts as the pitcher, the elder son the catcher, and the younger son the batter. Right before this segment, the elder son failed to catch the ball, and rushed to pick up the ball. The mother says, *hora: soreja i- (0.4) itten haichau yo*: ‘see, then o- one point, you will lose’, pointing at the elder son. Upon picking up the ball, the elder son initiates a gaze at the mother, achieving mutual eye-gaze with the mother, around the end of the mother’s utterance. This is the very moment at which the mother’s CATCH-A-BALL gesture is initiated. It is a distinctive position in the conversational sequence where a demonstration using a body becomes relevant; conducting a bodily action has just become effective by virtue of establishment of mutual-gaze. In this way, postposed construction in Japanese is sometimes driven by timely production of a gesture. We will show further examples in the presentation.

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Gesture accompanying usages of the Japanese spatio-temporal deixis *kore* and *sore* embedded in collaborative activities: Case studies from preparing works for Dosojn festival in Nozawa-Onsen

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In this presentation, we investigate how Japanese spatio-temporal deixis expressions *kore* and *sore* accompanying gestures are used in spontaneous context-dependent activities. In Japanese traditional grammar, *kore* ‘this’ refers to something close to the speaker’s space; on the other hand, *sore* ‘that’ refers to something close to the hearer’s space; furthermore, *are* ‘that’ (or, ‘yonder’) refers to an object neither close to the speaker’s nor to hearer’s space. Levinson (2004) suggests that spatial-temporal deixes can not specify their referents only by lexical expressions themselves but can do so only by co-occurring with gestures like pointing to or touching objects, which establishes mutual attention between interlocutors. Moreover, investigating data from Lao speakers, Enfield (2003) calls a place or an area which a speaker considers as ‘here’ at particular moment for a particular purpose HERE-SPACE. HERE-SPACE is a speaker’s engagement area, that is, a place which is a conceived site of a person’s currently dominant manual and attentional engagement and can vary according to the course of interaction. His discussion suggests that selection between *kore* and *sore* may depend on the contexts of activities in which participants are engaging.

With reference to these argument, we investigate in this presentation usages of spatio-temporal deixis *kore*- and *sore*-accompanying gestures from the following 3 points of view:

- 1) The distance to the referred object (close to the speaker or the hearer)
- 2) The postural configuration of the speaker and the hearers (such as vis-à-vis, side-by-side or front-back etc.)
- 3) The activities in which the speaker and the hearers are involved (same or different activity)

We analyze video data recorded through 6-years fieldwork in which participants engage preparing work for Dosojn festival in Kita Sinsyu Nozawa-onsen (Table 1).

One of the most important observation is that activities in which they are being involved mostly determine the usage of *kore* and *sore*. When co-workers are engaging in a common activity, the speaker regularly refers to the object with *kore*, and when a speaker wants to move to a next task, he uses *sore*, often accompanied with pointing in order to direct the hearer’s attention toward the new object (as shown in Figure 1,2). When a hearer has touched the object (Figure 2), the speaker can refer to it with *sore*. This means that postural configuration not of a speaker and hearers but also of hearers and objects will influence the selection of *kore* and *sore*. In this example, physical distance to the referred object from the speaker doesn’t affect the selection of the deixises.

This example illustrates that the selection of deixis is more related to which activity participants are engaging at that time than the physical distance to the object. If so, not solely a deictic expression itself but pointing or touching accompanying with it plays an important role for



exhibiting which activity is focused at the moment and then establishing it as common ground (Clark, 1996) between participants.

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Perspective in Norwegian Sign Language scene depictions

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This study investigates how and when signers engage different visual perspectives during depictions of spatial scenes. In such scene depictions, *route*, *survey*, *gaze*, and *mixed* perspectives have been observed and involve signers establishing different types of vantage points with which interlocutors can perceive and interpret spatial scenes (Emmorey & Falgier, 1999; Emmorey, Tversky, & Taylor, 2000). While vital to the coherence of these language events, descriptions of perspective remain quite limited and focus primarily on a dichotomy between route and survey perspectives, which align with the character and observer perspectives often described for narrative settings (see Perniss, 2007; Cormier *et al.*, 2012; Stec, 2012; Quinto-Pozos & Parill, 2015). This study attempts to problematize this dichotomy and provide a more varied and nuanced analysis of perspective in signed language scene depictions.

To do this, 12 deaf native Norwegian Sign Language signers were video-recorded as they participated in informal conversations with a native signing researcher, and in some cases another native deaf signing participant. The researcher, while tasked with maintaining a naturalistic and spontaneous interaction, also worked to guide participants into discussions involving spatial scenes with the goal of eliciting spontaneous and natural depictions. Such discussions were then identified and annotated for a number of features, including the purpose of the segment (directions vs. different types of descriptions), the signs produced, eye gaze direction, the location of the vantage point, and whether the vantage point moved or was stationary. It was also noted whether the signer was perceived as the narrator or as a ‘character’ within the scene. Analysis of these annotations revealed that survey and route perspectives, as they are currently characterized in the literature, do not adequately account for scene depictions observed in Norwegian Sign Language.

Findings show that the perspective chosen varies according to the signer’s purpose for the scene, the type of scene, and its scale. In addition, it was found that vantage points are important for all scene depictions and that birds-eye vantage points in survey depictions are rarely observed. Findings also challenge claims that moving vantage points are characteristic of a route perspective. In the data analyzed here, signers were quite capable of moving a vantage point through a scene while remaining an ‘outside’ narrator. These findings contrast with other accounts of scene depictions elicited in more controlled, experimental settings and show the importance of considering naturalistic, conversational data in these types of investigations. We argue that if we are to understand the nuanced complexity of spatial language in signed language, then we need more focus on deaf signers using this type of language for a range of purposes embedded within naturalistic settings.

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Data transparency and citation in gesture

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Gesture Studies has a strong history of qualitative and quantitative research that spans multiple research fields. What links all research in this area is a strong acknowledgement of the role of primary data in shaping our understanding of the form of gesture and its role in communication. Despite this acknowledgement, there is still not a robust culture of valuing *reproducibility*, which provides accountability in research by facilitating access to the underlying data and methods ensuring that other researchers may also reach the same conclusions (Gezelter 2014). Conventionalisation of research data citation processes enhances the accessibility and transparency of research across all disciplines (*cf.* e.g. Boulton 2014). It also provides additional benefits, such as raising the professional valuation of building gestural corpora that can be reused (Haspelmath & Michaelis 2014; Margetts *et al.* 2016; Berez-Kroeker *et al.* 2018).

A culture of valuing data transparency in Gesture Studies is beginning to coalesce. The flagship journal *GESTURE* has recently adopted the standards of the Center for Open Science, which requires thorough description of methods and analyses, plus presentations of data in publicly accessible online data repositories.

Skubisz's (2017) survey of data coding and terminology definitions in *GESTURE* demonstrated that these key features of research are often underspecified in articles published in the journal to date. In order to understand what *GESTURE* is trying to improve with the move to an Open Science framework, in this poster we present a survey of all research articles published in *GESTURE* from 2012 to 2017. For each article, we seek to understand how transparent each published article is in regard to the presence of clear research methods, and citation of data to a source that would allow the reader to analyse the data for themselves. Our survey complements Skubisz (2017) and indicates areas where the discipline can develop stronger data transparency processes. Of the 60 papers in the survey, 49 provide no indication of where the research data has been stored, while 31 papers provided no citation of individual examples to resolve them to the primary data. This paper replicates previous work investigating data citation practice in the field of linguistics (Gawne *et al.* 2017, Berez-Kroeker *et al.* 2017), which demonstrated that Gesture Studies is not the only field of research where a consistent approach to research data methods is needed.

We acknowledge that there are challenges inherent in the citation of data, including those around showing identifying footage of individuals (Green *et al.* 2013) as well as the granularity of citation and formatting (*cf.* Ball & Duke 2015). We therefore conclude with practical advice as part of ongoing work with the Research Data Alliance to improve data citation in research.

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Eye gaze and simultaneous constructions in Zinacantec family homesign

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The visual modality affords signed languages a special capacity for simultaneity that has no counterpart in spoken language. While a user of a spoken language is limited to a single vocal tract, a signer has at his or her disposal two hands, as well as the head, face, eyes, mouth, and torso. The linguistic organization of signed languages depends on the simultaneous recruitment of all of these articulators for their particular functions. Simultaneous structure is well attested in developed signed languages (Vermeerbergen, Leeson, and Crasborn, 2007), yet there have been few investigations of simultaneity in emerging signed languages. Here, I report on simultaneity in an emerging indigenous signed language of Mexico, Zinacantec Family Homesign (henceforth, Z), drawing on three key excerpts from an elicited cartoon re-telling by the youngest deaf Z signer. I demonstrate that Z signers partition their bodies into meaningful zones (Dudis 2004) onto which elements of a depiction can be mapped. Such zones include each of the hands as well as the locus of the signer and other co-present persons. To manage these multiple mappings, Z signers exploit the availability of different perspectives (Engberg-Pedersen 2015). From the character perspective, signers are able to enact or depict actions of narrated referents; from the narrator perspective, signers can establish new mappings, refer to old ones, or make comments about the narrative. The hands and body are involved in producing propositional content, while eye gaze is recruited independently to express perspective and direct addressee attention to salient discourse elements. This division of labor allows Z signers to deconstruct depicting signs into their meaningful components and refer to the entities represented in them via eye gaze. In other words, eye gaze is a primary mechanism through which Z signers can derive nouns from depicted actions. This is one possible strategy for handling the morphosyntactic ambiguity of depicting constructions in Z noted by Haviland (2011, 2013), and it contributes to the catalog of functions of eye gaze in Z sign assembled by Haviland (forthcoming). The ambiguous status of depicting constructions in sign language lexicons is a broader area of discussion in sign linguistics (Cormier *et al.* 2012). Data from typologically distinct sign systems such as Z contributes to the understanding of role of gesture in the organization of signed language lexicons.

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Early language acquisition in French Sign Language: Preliminary data on gestures and signs development

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Children acquiring Sign Languages follow a developmental sequence similar to their hearing counterparts acquiring spoken languages. Speech- and sign-exposed children (SP-E and SI-E respectively) communicate through gestural means—mainly deictic gestures—before they are able to produce their first lexical units: words or signs (Volterra, Iverson & Castrataro, 2006). Throughout the second year, two other types of communicative gestures complement the SP-E children's repertoires: conventional gestures (CG: codified gestures shared among a given community) and representational gestures (RG: or iconic gestures, representing a referent based on its formal aspects or the action associated with it). What is specific to the language acquisition of SI-E children is that gestural and lexical development occurs in the same visual-gestural modality. Indeed, both RG and signs are produced by the manual articulators and share referential and conventional properties. It is therefore highly challenging to determine if a production is a RG or a sign without precise criteria (Petitto, 1992; Volterra & Iverson, 1995; Hoiting & Slobin, 2007).

The overall aim of the present study is to explore gestural and linguistic development in French Sign Language (LSF). Our goal is twofold: 1) to collect developmental data on LSF acquisition from birth to 3 y.o in order to describe language acquisition milestones and lexical development in LSF and 2) to consider the gesture-sign continuum by investigating the way children reorganize their gestural communication system during language development, i.e., how gestural linguistic components are integrated into the existing prelinguistic gestural repertoire. We collected longitudinal data on four children exposed to LSF from birth by their deaf parents. Parent-child dyads were videotaped at monthly intervals during 45-minute spontaneous interactions (snack or play time). This study presents the preliminary results of 3 children (1 deaf and 2 hearing). Spontaneous gesturing and signing were coded and analyzed in terms of frequency between 9 and 18 months. The developmental progression of communicative gestures and signs observed is in line with previous research. First signs appeared around twelve months and are preceded by communicative gestures. Deictic gestures are the most prominent type among communicative gestures and are used not only in the early stage but also after first signs emerged. In all sessions, the children used more deictic (pointing, showing, and giving gestures) than other types of gestures or signs. From 14 months on, the analysis shows a significant increase in frequency of signs and gesture-sign types (those whose status is not clear), these two types will be analysed and described further. Finally, we observe a similar increase in the number, type and frequency of signs in the data from the parental input, which we discuss in the conclusions.

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How gesture and action guide children’s attention during word learning

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The movements we produce can help us learn. Two such movements are *actions*, hand movements that directly manipulate our environment, and *gestures*, hand movements that accompany speech and represent ideas but do *not* lead to physical changes. Both action and gesture can facilitate learning (e.g., James & Swain, 2011; Wakefield & James, 2015). However, they do so in different ways. Wakefield *et al.* (2016) explored how learning through actions *on* objects vs. gestures *off* objects impacts 4- and 5-year-olds’ understanding of novel words for actions performed on objects. Results showed that children can learn from both types of movement, but learning occurs more quickly when children learn through *action* compared to *gesture*. Subsequent work by Wakefield and colleagues (2017) expanded upon this finding by testing children’s ability to *generalise* their knowledge of novel words. Though children again learned novel action words through both action and gesture, children who learned through gesture were more likely to *generalise* words across different contexts.

It is unclear what mechanisms are responsible for these differences in learning through action vs. gesture. One possibility is that gesture’s unique ability to draw attention to a movement itself, rather than an object being acted upon, could facilitate generalization of a word for that movement. Wakefield *et al.* (2017) found that indexical behaviors of children’s attention—eye gaze and object handling—during learning through either action or gesture did not predict differences in *generalisation*. Still, differences in how gesture and action guide children’s attention may predict differences in how these movements facilitate *initial learning* of a word. Here, we revisit data from Wakefield *et al.* (2016) and examine how children’s eye gaze and object handling vary depending on the learning context: action or gesture. Though the learning procedures for action and gesture were designed to be as equivalent as possible, opportunities for children to handle the objects with which they learn vary across conditions.

We predict that children who look at and handle objects more frequently during learning will learn the object-action word associations more quickly than children who look at and interact less frequently with objects. Because learning through actions *on* objects will likely draw children’s attention more directly to objects themselves than learning through gestures *off* objects, we expect to see lower rates of indexing behaviors for children in the gesture condition, and thus, slower learning overall. Though gesture’s lack of emphasis on objects may slow initial learning, this separation of object from movement may partially explain gesture’s facilitation of generalisation. The ability to generalise an action word beyond the initial learning context arguably indicates a deeper understanding of that word, and thus, slower initial learning through gesture may still result in more robust learning overall.

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The multimodal organization of children's social locomotor play

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Play is children's signal activity and their chief competency. We focus on the endogenous organization of children's social locomotor play. Locomotor play accounts for an estimated 7-10% of free time behavior in late childhood (Pellegrini, 1995) and is characterized by energy-intensive actions like running, jumping, shouting, singing, and flailing about. Our interest is in how children collaboratively bring off these episodes together using gesture, body movement, bodily conformations, gaze, and singing. Using multimodal conversation analysis, we examine the temporal and sequential coordination of multimodal resources as these activities get launched and proceed as recognizable bouts of play.

Our materials are 40 hours of multi-angle video recordings of multiple classes of 5-6yo children engaged in an immersive science activity at school. For this activity, children learned about states of matter before moving to an open play space where they embodied 'particles'. Adjacent to the play space was a large screen where children could view their activity in real time. Using motion-capture technology, a dot (the 'particle') was superimposed on each child's video image. As the children moved about, their dots would change color and form links with others depending on the relative proximity and velocity of other particles, thereby indicating solid, liquid, or gaseous states of matter. This activity offers a perspicuous setting for analyzing children's bodily-vocal practices in locomotor play. Not only are the children officially 'playing', they also enjoy considerable latitude in their range of actions as they (re)configure different participatory arrangements.

In one case in our collection, four children (w, X, Y, and Z) have assembled themselves in a chain formation (side-by-side, arms hooked at elbows) facing the screen, as depicted below:

W-X-Y-Z
[screen]

After 1.3s of observing themselves on screen, Y begins to march in place, raising her right leg and extending it for a kick. This is evidently all that's required to initiate play: as Y lowers her kick, Z begins moving her left leg in preparation to join the marching/kicking. The two then both kick together, raising and lowering their legs in synchrony. As this proceeds, Z begins loudly singing a tune in rhythm with her kicking ("da-da-da..."). It takes only 0.8s of hearing this song for Y to join in and sing along.

Instances like this demonstrate how little public conduct is needed to afford participation in locomotor play. Just one kick or just 0.8s of singing are evidently sufficient for joining in. This case also shows how participants can use an ongoing pattern of conduct (marching/kicking) as a resource for producing other conduct (singing vocalization). The recognizable accomplishment of social locomotor play, then, relies on practical knowledge about how to coordinate vocalizations and bodily movement.

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The effects of gesture on children's spatial and event memory

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Observing gestures enhances children's comprehension of a given message (McNeill, Alibali & Evans, 2000). Preschoolers understand a narrative better when the narrative is told with iconic or deictic gestures (Macoun & Sweller, 2016). Additionally, 3- and 4-year-old children who are given verbal description of a target path recall the spatial information better when iconic or beat gestures are presented during the encoding (Austin & Sweller, 2014). Others suggest that iconic gestures, but not beat gestures, enhance 4- and 5-year-old children's memory (So *et al.*, 2012). The present study asks whether: (i) observing gestures influences children's spatial and event memory; (ii) the type of gestures used during narration affects children's recall of spatial and event information; and (iii) children's own gesture production and language abilities are related to their recall performance.

Five-year-old children (n=30, 15 females) were first asked daily questions (e.g., can you explain how to play your favorite game?) and questions that encourage them to use spatial information (e.g., can you describe how you would go from the kitchen to the bathroom in your home?) to measure their gesture frequencies. They then listened a story, involving 5 path directions (e.g., walking *around* the mountain) and 5 different events (e.g., picking flowers). The experimenter told the same story in one of these conditions: (i) using iconic gestures, (ii) using beat gestures, or (iii) no gesture. At the end of the story, children were asked to tell what they remembered from the story. After this free recall, they were asked 10 multiple-choice questions about the story. Children's speech and gestures for gesture production questions and free recall were coded. In free recall speech, the correct locations and directions for spatial information and the correct objects and movements for events were scored. The gestures of children in gesture frequency questions were categorized as iconic, pointing, and other (i.e. emblems). For spatial information questions, children's gestures were coded whether they referred to location or direction. To test receptive and expressive language abilities of children, TEDIL (Turkish Early Language Development Test) was used.

The preliminary analyses revealed no significant difference among three conditions in children's recall performance ($M_{beat} = 16.39$, $M_{iconic} = 22.75$, and $M_{nogesture} = 22.75$). However, data collection is ongoing. The gesture production frequency of children correlated with spatial information during free recall ($r = .47$, $p < .05$). No correlation was found between children's gesture frequency and event recall. Children's receptive and expressive language abilities correlated with their recall performance in multiple choice questions ($r = .39$ and $r = .47$, $p < .05$, respectively).

These findings suggest that overall language abilities are related to children's recognition for spatial and event information and children's gesture frequency can affect their recollection of spatial information.



Lexical variation in Ethiopian Sign Language

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The sociolinguistic study of the signed languages is one that takes the attention of many linguists. Variation is the fundamental characteristics of language that is studied in sociolinguistics. “If the structure is at heart of language, then variation defines its soul”. Both spoken languages and Sign languages exhibit variation. That is, users of spoken languages and Sign languages have alternate ways of saying the same thing (Ceil Lucas *et al.* 2003). Schembri and Johnston also reported that the study on phonological variation (the location variable) seeks to improve scholars understanding of the linguistic and social influences on phonological variation in Auslan (2001). Here my study describes the existence of the lexical variation in Ethiopian Sign language (EthSL). The study also explains the sociolinguistic situations in sign language and the factors that drive for the formation of variations in sign languages. The linguistic and social factors that bring variations are also explained. The Lexical level and region (Place where Deaf students in AAU come from) are the two variables taken in this study as internal/linguistic and External/social factors respectively.

The study is conducted in Addis Ababa University main campus where various Deaf students come from different corners of the country. The data is collected through questionnaire, observation and video data recordings. The questionnaire was filled by all selected respondents and results are presented in chapter four. The observation made by the researcher to find out the lexical variation. The video tape recordings to see variation in signing form an important part of the research. The varieties of words are collected from three respondents’ story telling about “Three Lions and one Shepherd” and other words collected from respondents’ questionnaire. The videoed signs elicited and discussed and also explained.

The findings clearly show that age, gender and schooling or background factors are crucial to the creation of lexical variations in EthSL among the three groups of signers in relation to the region they stayed in. The lexical variations observed can be divided in to lexical variants and phonologically related variants. For example: Sign SALT by different signers from different places.

Based on the findings it was recommended that sign linguists, educators, sign language interpreters and other concerned bodies should aware and describe about the lexical variation in EthSL.

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Individual differences in gesture production during spatial tasks

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There is mixed evidence on whether gesture restriction impairs or enhances speech production (Hostetter *et al.*, 2007; Melinger & Levelt, 2004). The present study investigates the role of gesturing on the use of spatial language in describing directions and solving a spatial problem. There are also individual differences in solving spatial tasks such as mental rotation, and how people benefit from gesturing in these tasks (Chu & Kita, 2008). We ask whether (1) speakers' use of spatial language changes as function of gesture restriction, and (2) this is related to individual differences such as overall gesture use, working memory, and verbal fluency.

Participants (n=24) completed two different spatial tasks; route descriptions on a map and a series of mental rotation problems. In the map task, participants described two different routes on a map in spontaneous speech and when gestures were restricted. In the mental rotation task, participants solved mental rotation problems and described their solution both in spontaneous speech and gesture-restricted conditions. Participant's speech in both conditions and tasks was coded for the use spatial language such as rotation terms (e.g. "turn"), directions (e.g. "move left"), static locative relations (e.g. "on the left"), and landmarks (e.g. "bridge") for the map. Gestures were categorized into: dynamic iconic, static iconic, static pointing, and tracing gestures. For working memory, both backward and forward digit span tasks were used. Verbal fluency was tested at the semantic and phonemic levels.

Results showed that during the route description task participants used more tracing gestures than dynamic gestures, $p = .027$. The overall spatial language use did not change between spontaneous speech and gesture-restricted conditions. However, more landmark information was used when their gestures were restricted, $p = .001$. For the mental rotation task, participants produced more spatial words in gesture-restricted condition than spontaneous speech, $p = .006$. Gesture use in the mental rotation task positively correlated with the total mental rotation score obtained in spontaneous speech condition, $r = .40$, $p = .05$. For individual differences, only phonemic fluency scores positively correlated with gesture use in route descriptions, $r = .42$, $p = .042$. The mental rotation scores in spontaneous speech, but not in gesture-restricted condition, correlated positively with working memory tasks, $r = .66$, $p < .001$. Last, semantic fluency scores positively correlated with the gesture use in mental rotation task, $r = .50$, $p = .013$.

Our findings suggest that gesture restriction may have differential effects on spatial language depending on the spatial task. Specifically, for only the mental rotation task gesture restriction increased the use of spatial information. Moreover, individual variations in solving spatial tasks might have an impact on this process. Taken together, prohibiting gesture use and individual differences in cognitive tasks can be associated with different spatial tasks.



The effects of observing and producing gestures on foreign word learning

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Observing and producing gesture can enhance native language learning. Observing an instructor's gestures during learning enhances a learner's comprehension of verbal information, and producing gestures themselves promotes a learner's memory performance. However, research examining the effects of observing and producing gesture in foreign word learning is limited, as is an examination of any differential effects of gesture on retention of the learned information after a delay. The current study examined the effect of observing and producing gestures on memory task performance during foreign word learning. English-speaking university students were verbally presented with 10 Japanese verbs, with or without accompanying gestures. Participants were randomly allocated to one of three training conditions. In the no gesture condition, the instructor spoke the Japanese words and accompanying translations with no accompanying gesture. In the observe condition, the instructor produced iconic gestures accompanying the verbal portion of the instruction, but participants were not instructed to produce any gestures themselves. Finally, in the observe and produce condition, the instructor produced the same iconic gestures as in the observe condition, but in addition, participants were asked to themselves produce (by imitating) the instructor's gestures during training. Participants verbally recalled the words immediately following training and after a one-week delay. Both observing only as well as observing and producing gestures at encoding enhanced learning beyond verbal learning alone. There was no difference in recall between only observing and observing and producing gestures. Producing the instructor's gestures during learning did however increase the rate of spontaneous iconic gesture production during recall. Furthermore, increased gesture production at recall was positively associated with the number of recalled words. Both observing and producing an instructor's gestures during learning were equally beneficial for both the short and longer term, with no significant differences between conditions on the decrease in recall between the two test time points. Findings emphasise the importance of an instructor's gesture production during foreign language learning.



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