International Society for Gesture Studies
Third International Conference

"Integrating Gestures"

June 18-21, 2007
Northwestern University
Evanston, Illinois

Articulate, Gesticulate, Integrate

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9:00-9:30 Plenary: Welcome Addresses (Concert Hall)

9:30-10:30 Parallel Sessions
SESSION 1A: COMBINATORICS (Concert Hall)

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Compositionality In Iconic Gestures

When people give directions, they often use sequences of gestures to depict virtual maps: relationships among landmarks, paths around those landmarks, and the visual and spatial properties of objects along the way. These sequences of gestures combine to form unified depictions or scenes. Based on this phenomenon, I reexamine the idea that gesture meaning is non-combinatoric, or that individual gestures do not combine to form meaningful, higher-level units or ideas (McNeill, 1992). I will show that multi-part map gestures can be considered compositional gesture units (a term introduced by Kendon, 1990), with an organizing structure at the discourse-level. In related work, these results have been incorporated into an initial computational model for automatic planning and generation of language and gesture for an embodied, direction-giving, computer agent (Striegnitz, Tepper, Lovett & Cassell, 2005).

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How Coverbal Gestures May Combine: Forms And Functions Of Gesture Complexes

Modern gesture research has shown that in cooperation with speech coverbal gestures contribute manifoldly to the representation of objects or facts and circumstances of the world (cf. McNeill 1992; Müller 1998; Müller 2004; Kendon 2004). So far studies have focused almost exclusively on the form and function of single gestures. However, in everyday conversation gestures frequently do not occur as single items, even within one utterance. The aim of this talk is to show that spontaneous coverbal gestures are not only involved as simple units in the conveyance of information, but also as complex phenomena, i.e. in combination with each other. Based on a detailed micro-analysis of a video-recorded free everyday narrative of a German speaker different forms and functions of gestural combinations will be reconstructed. First of all, I will demonstrate systematic patterns by which two or more gestures may combine and build a larger complex. A gesture complex is defined as a local entity of at least two single gestures that are combined in a directly perceptible way: Since speakers can use both hands jointly as well as independently of each other for gestural performance it is possible to realize different gestures in varying forms of temporal overlap. In addition to these formal considerations, examples will be presented that illustrate usage functions of gesture complexes with respect to complex representations of objects, states of affairs and coherencies in the narrated story. These findings may add another contribution to the ongoing discussion regarding the nature of spontaneous coverbal gestures. More specifically, they will help to further clarify the assumption of gesticulation as being a solely global-synthetic and noncombinatoric mode of expression (cf. McNeill 1992; Singleton et al. 1995).

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SESSION 1B: ARTS (Rehearsal Room)

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The Analysis Of Gesture In The Visual Arts Of The West

Many works of art, specifically paintings and sculptures, show human bodies in motion or showcase traces of body movements, including gestures of the hand. This raises the issue how the artists succeeded in depicting or insinuating movement in media that are inherently still: how arrested motions can be made fluid in the eyes of the beholder, and how arrested gestures function in pictures of social life so that these are perceived as "legible interactions" (Gombrich). This paper examines a number of representative attempts, made during different

periods of Western art-history, to solve this problem: in Egyptian, Greek, and Hellenistic art; in some medieval illuminations; in the early and late Renaissance; and in the 20th century styles of *Ècriture automatique* and Abstract Expressionism (action- or gesture-field painting of the New York School). Each of these is predicated on three types of analysis: of ways in which body motion communicates meaning; of visual perception; and of the nature of pictorial representation. By scrutinizing the changing logic of representation of embodied communication in the visual arts, gesture researchers can gain new insights into the relationships between movement, form, meaning, and context, and better situate their own analytic methodologies within the broader discourse on human behavior and its interpretation

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Kairos - A Rhetorical Study Of Timing In Nonverbal Communication

Kairos, is a qualitative concept for time. It reflects the opportune moment in a situation when someone is doing the right thing at the right time. Kairos catches the course of events that is so difficult to understand when everything all of a sudden crystallizes to the "right time" for someone to act or to speak. What is time in this sense and how does it relate to our nonverbal communication, to actio? Actio, meaning our nonverbal communication including gestures and voice in speech situations, was a living part of rhetorical training from the classical period with Aristotle, Quinitilian and Cicero setting the standard. Actio as a means for rhetorical persuasion has from ancient times until today been used as a way of getting one's message across. Although rhetoric has theories and methods for research about written composition, little has been done about actio. The primary focus in this study is on finding a theory for rhetorical research on nonverbal communication. To do so, I have, as a starting point, looked at the actio of university teachers' lectures. In the presentation of my paper, I will present what I have discovered about how actio relates to the rhetorical concept of kairos in lecturing.

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SESSION 1C: DISCOURSE DOMAINS (Recital Hall)

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Verbal And Non-Verbal Deictic Resources In Multilingual Speakers

The aim of this presentation is to analyze the relationship between certain verbal and nonverbal deictic resources in the production of oral text by multilingual speakers. Deixis is usually conceived from the linguistic point of view as a phenomenon that allows the connection between structural language features and specific contextual domains, particularly in personal, temporal, and spatial axes. Non-verbal mechanisms also act as deictic resources in many registers and situations in oral language. However, studies of the combination of these different kinds of mechanisms are needed to improve our knowledge of the synchronization of these multimodal signals. The data used in this research come from a multilingual, multimodal corpus (CAP, Corpus Audiovisual Plurilingüe, University of Barcelona). This corpus contains 360 oral texts by twelve informants (all of them Catalan-Spanish bilinguals with an intermediate level of proficiency in English) who were interviewed in three individual session, in a different language each session. Informants were 2nd cycle students of business studies who were at school during the 1980s and 1990s, grouped as follows: four bilinguals with Catalan as L1 (or dominant language), four with Spanish as L1, and four with no predominant language (family bilinguals).
Specifically, the study describes space markers and their relation with the language of production (Catalan, Spanish, and English), the informant's mother tongue (Catalan, Spanish, or both) and text types (narrative, descriptive, expositive, argumentative, and instructive).

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Spatial Organization Of Sequenced Actions

This paper corresponds to part of a life-history study, conducted through a series of ethnographic interviews, in which participants answered two questions: *What is your occupation or trade?* and *How do you carry it out?* As a response, our subjects described a series of typical activities associated with their job. In their descriptions, two principal discourse patterns have emerged. In one, speakers provide a sequentially ordered listing of activities. In another, they present a hierarchical description in which a macro-encoded action, e.g. *setting the table*, is then broken down into a series of smaller activities involved: extending the table-cloth, setting down the plates, placing the knives and forks, centering the flowers.   We examine the gestures associated with these descriptions and find the use of three principal strategies: 1. Enacting the activities involved using props or instruments to pantomime corresponding actions. 2. Use of sequencing *markers* to accompany a list of actions, such as rhythmic movements of head, torso or hands, to one side or the other. 3. Spatial structuring in which for each *macro-event* a three-dimensional *work space* is gesturally recreated for the interlocutor and appropriate actions displayed within it in an organized manner. We examine the sequencing links between macro-events and the spatial displays of the sub-activities.   The data are taken from ten interviews done with residents of Puebla, all native speakers of Mexican Spanish. They were gathered through ethnographic interviews carried out at their place of work or residence. The sections of the interviews being analysed correspond to questions about their jobs or occupations. The jobs presented are varied and include waiter, seamstress (2), mechanic, embalmer, plumber, jeweller, baker, car-washer and glass blower which allow for the display of a broad range of types of associated activities and different spatial organizations. (1960)

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SESSION 1D: COLLABORATIVE INTERACTION (Band Room)

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Speech-Gesture Mismatch And How It Changes In A Problem Described By A Client

In psychotherapy, clients describe their problems in their own words, which are often accompanied by gestures. Interestingly, mismatches between speech and gesture as well as within words are observed, and they become resolved as the counseling proceeds. We report a case study demonstrating speech-gesture relationship changes in a therapeutic interaction.   The case study consisted of a series of interviews conducted as part of the "reflecting process" in family therapy. The client initially characterized his problem as having too many tasks to manage in his schedule. As it turned out, however, the real problem was that he thought himself as being lazy. He made himself extremely busy to cope with the problem, because doing so obscured his laziness. Among other things, a shift in conceptualization was achieved by fixing the problem with his use of the Japanese word, "konasu" (to manage to do), which entails an active involvement of the actor. He frequently used this word to describe how he performed his tasks. Although the client's utterances and concurrent gestures had elements representing the notion of active involvement, there was also an element in his utterances that suggested the opposite: that he tended to let his schedule go without so much involvement. Noticing that, the therapist asked for clarification. Although in his paraphrases of 'konasu' the client kept invoking the notion of active involvement, through therapeutic interaction involving effective use of gestures, the therapist could bring the mismatch to the client's attention.   We consider this case study as pointing to the possibility that speech-gesture mismatch could serve

not only as an index of ambivalence in the client's conceptualization of the real problem, but also as media with which the psychological problem can be solved.

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Gesture Use In Collaborative Interaction

Numerous studies into human communication have provided evidence that language use is a collaborative act. Interlocutors are jointly trying to reach their communicational goal(s); accumulating common ground and creating alignment is a major part of this process. However, the vast majority of studies into this topic have focused on verbal communication. One important question therefore is how such social-interactional processes affect gesture use and what role gestures play in collaborative processes of communication. Findings relating to two experimental studies are presented which focus on the association between gesture use and common ground in talk. The first part of the talk focuses on a study investigating how shared knowledge between interactants, existing from the outset of a conversation, affects the use of gesture and speech in the communication of size information in a referential communication task. The findings show that common ground does indeed affect how speakers represent the size of entities, as well as the semantic interplay of gesture and speech in this context. Secondly, insights are provided into how accumulating common ground affects gesture frequency and qualitative aspects of these gestures, as well as the role that gestures may play in the process of grounding information in talk. Overall, the findings provide further evidence for social-interactional functions of speech-accompanying hand gestures and reveal insights into the involvement of gesture in core processes of collaborative interaction.

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11:00-12:00 Plenary Session: Keynote 1 (Concert Hall)

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Gesture As Window Onto Language And Thought

The gestures we produce when we talk offer a unique window onto our thoughts and often display our readiness to learn a task well before we make actual progress on the task. Even more striking, there is evidence that the gestures that accompany speech not only reflect our thoughts, but also play a role in shaping those thoughts. Although gesture is typically produced with speech, under unusual circumstances, it can be produced on its own, without any speech at all. In these instances, gesture takes over the full burden of communication usually shared by the two modalities and, in doing so, becomes language-like in structure. In this talk, I focus first on gesture when it *is* language in deaf children who cannot learn a spoken language and have not been exposed to a sign language. Here gesture provides insight into the language-making capacities of children. I then focus on gesture when it is *part of* language in hearing children and adults who use gesture along with speech. Here gesture works together with speech to form a single integrated system and provides insight into how we think. I end by describing how gesture can be experimentally manipulated and transformed from a system that is integrated with speech and part of language *into* one that stands on its own and is itself language. Gesture can thus be part of language or be language and, as such, provides insight into fundamental aspects of both language and thought.

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1:00-3:00 Parallel Sessions

SESSION 2A: COMMUNICATIVITY & COMPREHENSION (Concert Hall)
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On-Line Interactions Between Speech And Gesture During Comprehension

Researchers have theorized that gesture and speech comprise an integrated system (Kendon, 2004; McNeill, 1992) and have found that gestures influence language comprehension, using behavioural and electrophysiological measures (Casell et al., 1999; Goldin-Meadow, 2003; Kelly, et al, 1999; 2004; Özyürek et al, in press). However, little is known about 1) whether gesture and speech mutually influence one another's meaning and 2) the on-line processes that underlie this bimodal comprehension. We investigated these questions in four experiments in which participants watched videos containing action primes (wiping a table) and gesture and speech targets, and then indicated whether the targets (gesture or speech) matched the primes. Exp. 1 showed that participants were fastest when simultaneous speech and gesture targets conveyed congruent information (speech and gesture: wipe) compared to when speech (wipe) or gesture (wipe) occurred alone. However, Exp. 2 demonstrated that participants were slower and less accurate when simultaneous speech and gesture conveyed incongruous information (speech: wipe; gesture: chop) compared to when speech and gesture occurred alone, suggesting that the semantic relations between speech and gesture play a role in comprehension of each modality. Exp. 3 investigated whether the strength of semantic incongruity influenced speech and gesture processing. Participants were less accurate when simultaneous gesture and speech were strongly incongruent (speech: wipe; gesture: chop) than weakly incongruent (speech: wipe; gesture: scrub). This shows that the interaction between modalities occurs during on-line semantic processing and not at a later decision stage. This result was replicated in Exp. 4 even when participants were told to ignore gesture and attend only to speech. Thus, the study overall provides the first on-line experimental evidence that mutual interaction between modalities occurs during on-line comprehension and at early stages of semantic processing

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The Influence Of Personality On The Perception Of Embodied Agent's Multimodal Behavior

Experimental research on arrangement of verbal and non-verbal information in multimedia presentations has little considered multimodal behavior of Embodied Conversational Agents (ECAs). In previous studies, we explored the effects of different types of speech-gesture cooperation: redundancy (iconic or pointing gestures duplicate pieces of information conveyed by speech), complementarity (distribution of information across speech and gestures) and a control condition in which gesture did not convey semantic information. 54 male and 54 female users participated in the experiment. The results showed that redundancy increased verbal information recall, ratings of the quality of explanation, and expressiveness of ECAs. It also resulted in higher likeability scores for the ECAs and a more positive perception of their personality.
In the present research, we performed additional analyses in order to test whether users' personality could influence the previous pattern of results. We collected users' scores on the EPI (Eysenck Personality Inventory), which indicate their level of Introversion / Extroversion. This personality dimension is indeed partly related to people's nonverbal behavior, and we hypothesized that it may influence the perception of others' behavior.

Although there was no main effect of Personality, several interaction effects between Personality, Users' Gender and ECAs' Behavior appeared. The results can be summarized as follows: the benefits of speech-gesture redundancy were found on extroverts and on male introverts, but ECAs' multimodal behavior had no effect on female introverts. Consistent with theories on personalities, we assume that introverts expended more internal cognitive strategies and were thus less influenced by external conditions (ECAs' behavior): these internal strategies might be visual-spatial for males and auditory-verbal for females, as predicted by the literature on gender differences, which could explain why female introverts were not affected by ECAs' nonverbal behavior.

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The Communicative Import Of Gestures:
Evidence From A Comparative Analysis Of Human-Human And Human-Machine Interactions

Many studies have addressed the question why people gesture. Some studies, such as Alibali, Heath, and Myers (2001), Özyürek (2002), and Jacobs and Garnham (2006), have shown that hand gestures can be produced with a communicative intent. What would this imply for communication with computers? Media equation theory suggests that people treat computers like human interlocutors, whereas other data suggest that people communicating with computers make less communicative efforts (for example in referential expressions). We conducted a study in which 41 native speakers of Dutch had to re-tell the story of an animated cartoon, in either one of four conditions. In condition 1 we asked them to tell the story to an experimental audiovisual speech recognition system. They did so via camera. We emphasized that the system processed both auditory and visual information. In condition 2 we asked participants to talk to an addressee who was watching them on camera. In condition 3 they spoke to an addressee who was in the same room, but behind a wooden screen. Condition 4 was normal face-to-face communication. Condition 3 and 4 resemble conditions of an experiment by Alibali et al. Participants produced significantly fewer gestures per 100 words (both representational and non representational) when they thought to be talking to a computer system (mean = 0.625), than when (they thought to be) talking to a human addressee (means 3.75, 4.45, 6.12 for condition 2, 3, and 4 resp.). They also spoke more slowly and used fewer words. We did not find any significant differences in gesture rate between the three conditions with a human addressee. Our study shows that people narrate differently to a computer system than to a human addressee. Fewer gestures were produced when talking to a computer system and fewer words were used. In addition, the data seem to support the idea that, in narrative tasks, most gestures are produced with a communicative intent.

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Do Iconic Gestures Really Carry Critical Semantic Information In Talk?

Speech has long been recognised as the primary channel of semantic communication, but it is a common observation that people spontaneously gesture while they talk, and the form of some of these gestures appear closely connected to the content of the speech. McNeill (1985; 1992; 2000) has hypothesised that these gestures, which are imagistic in form, contribute to meaning alongside the speech itself. This paper will outline new research into the possible communicative functions of these iconic gestures that accompany speech. The research tests the communicative function of iconic gestures by investigating whether the information encoded in these gestures is of genuine critical importance to the narrative as a whole, as judged by the original narrator as well as independent raters, and that when you experimentally change the consequentiality of certain semantic features for

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the narrative outcome then the gestural modality responds appropriately. The paper will also review evidence that early research by Beattie and Shovelton into the communicative function of iconic gestures is not confined to the presentation of gestures on video screens but rather the results do generalise to face-to-face presentations, with actual speakers gesturing and talking in real time. The new research also considers how the visual attention of listeners affects the processing of iconic gestures; this aspect of the research uses eye-tracking methodology to systematically study the focus of listeners' visual attention whilst listening to communicative messages. Overall, the paper will present a new wave of research into how iconic gestures carry crucial semantic information to listeners in everyday talk.

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SESSION 2B: GESTURE IN SIGN LANGUAGE (Rehearsal Room)

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Constraints On The Representation Of Manner And Path In Caused Motion Events
In Sign And Gesture

The idea that sign languages are heterogeneous systems, which combine linguistic and gestural elements, has been gaining in popularity and is supported through two main lines of argument. On the one hand, there is evidence that gestures used by the surrounding speech community become grammaticalized into the sign language system (McClave 2001; Wilcox 2004; Zeshan 2003). On the other hand, the difficulty of analyzing certain types of signs (in particular, directional verbs, pointing signs, and classifier predicates of location and motion) in strict morphological terms has led researchers to assume that they contain both linguistic and gestural elements (Cogill-Koez 2000; Liddell 2003; Schembri 2001).

However, the co-existence of linguistic and gestural elements in sign language, that is, in a rule-governed language system as a whole, is not well understood. This paper looks at the representation of referent location, motion, and action as a domain in which similar uses of space have been found to occur in signing and in the gestures accompanying speech. On the basis of data collected from short cartoon stimulus films, I compare the representation of manner and path in caused motion events in German Sign Language (*Deutsche Gebärdensprache,* DGS) and the co-speech gestures of German event narratives. Differences between the signed and gestural representations are discussed in terms of possible linguistic constraints in DGS. The existence of sign language-specific linguistic-constraints is underscored through a comparison between the DGS representations with similar representations in Turkish Sign Language (*Türk Isaret Dili,* TID). The analysis is important to our understanding of the influence of the visual modality on the encoding of motion events.

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Management Of Space And Viewpoint In Japanese Sign Language Discourse

Sign language is equipped with a number of devices that exploit the spatial nature of its medium.We focus in this paper on the management of space and viewpoint in narrative discourses in Japanese Sign Language, and argue that non-lexical manual expressions play a significant role in maintaining both the coherence of spatial relationships among discourse objects and the consistency of viewpoint transitions by the speaker.

Sign language utterances tend to avoid complex embedded structures because of the flat placement of discourse objects in signing space. This tendency leads to frequent use of direct discourse in narrative discourse. Narrative flow dictates the switch of speaker viewpoints. But there are also a number of lexical verbs that place strict

constraints on character viewpoints, resulting in frequent and quick viewpoint switches compared with speech narratives. This poses serious problems of keeping track of both whose viewpoint the speaker is taking on and where each discourse objects are located in the signing space.

We extracted portions of direct discourse from Japanese sign language narrative video data, and examined the methods, employed by the speaker, by which character viewpoint and spatial relationship among discourse objects are indicated. We found that non-lexical manual expressions similar to interactive gestures in spoken dialogues, including those for getting attention of the addressee and those for expressing rejection, are often effectively employed. Different from regular lexical signs, non-lexical manual expressions have fixed spatial directionality from the speaker to the addressee. We believe that this fixed directionality of non-lexical manual expressions makes it possible for both the speaker and the hearer to utilize them as effective constraints to identify both character viewpoints and spatial arrangements of discourse objects, thereby establishing them as spatial devices for sign language discourse management.

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Gestural Enactment Across Different Registers Of American Sign Language

We describe the effect that context and level of formality, or *register*, can have on the production of a signed text, and our focus is on gestural enactments that complement linguistic devices. In particular, the study examines American Sign Language production across three registers: formal, non-formal, and student-directed. Two Deaf native signers of ASL each presented the same culturally-relevant text in three different settings.

Data analysis has focused on *constructed action* (CA), or the signer's use of the body, eyegaze, and head movement to mimetically convey information about a character (also referred to as "character viewpoint", "enactment", etc.).

Both participants used more emphatic CA in the student-directed register than in the other two registers, which was characterized by movement of the signer from one location to another to match a character's actions (e.g., taking steps or emphatic displacement of the torso from a neutral position). Patterns of CA in the non-formal register were the most subtle. In that register, torso shift depicting two or more characters was nearly non-existent, whereas torso shift in the formal register for the same purpose was more salient.

Various characteristics of torso shift, sign articulation, and eyegaze can be used to contrast CA with the linguistic system. Lexically, a signer can articulate some signs in conventional ways or she can modify the signs gesturally to depict a character's behavior. A signer can also shift her torso to indicate non-first person characters, usually considered as part of the grammar, whereas more emphatic torso shifts seem to signal the way in which a character actually moves her torso.

Data from two native ASL signers indicate that constructed action occurs in all registers—regardless of the level of formality of the setting, and it appears to pattern in specific ways in each register. The degree of emphasis of the constructed action differs as a function of the formality of the event.

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Iconic Mouth Gestures in a Sign Language

The theoretical context of this study ascribes to sign languages many modality-independent universal properties that are explicitly linguistic (Sandler & Lillo-Martin 2006). This means that, in terms of its structure and organization, language in the signed modality is not inherently gestural but linguistic, despite the fact that its words are conveyed by the hands. Within that context, this paper provides new evidence for the existence of a gestural component. Specifically, the study extracts from the panoply of complex nonmanual signals found in Israeli Sign Language (ISL) a particular category of mouth gestures that corresponds to the iconic co-speech hand

gestures as defined by McNeill (1992). The mouth gestures (shown to be distinct from other functions of the mouth in ISL) convey physical properties or sensations, such as dimension, weight, contact between objects, and vibrations or sounds. Like their counterparts in co-speech hand gesture, and unlike the units of the linguistic system, these co-sign mouth gestures are global in form and idiosyncratic in use, and their interpretation is context-dependent. And like the iconic subset of co-speech gestures, the form of a mouth gesture bears a clear and direct relationship to its meaning. Each of these properties is exemplified with data from four ISL signers retelling an animated cartoon story (Canary Row).   The study leads to the conclusion that two complementary, simultaneously transmitted components characterize human communication universally. One conveys language through a formal system of standardized, discrete, combinatoric units. The other component complements linguistically organized forms with spontaneously generated, idiosyncratic, holistic images.

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SESSION 2C: PANEL: LANGUAGE DEVELOPMENT (Part 1) (Recital Hall)

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Gesture In Early And Late Language Development
The purpose of this thematic session is to gather information and workshop on the cross-cultural and cross-linguistic research about the links between gesture and language acquisition.
The multimodal reality of adult speech is well established today (Poggi & Magno-Caldognetto, 1997; Calbris, 2003; Kendon, 2004), as well as the evidence of the complementary semiotic nature of speech and gesture signs (McNeill, 2005). We also know that the speaker integrates auditory and visual information from linguistic, prosodic and gesture sources into a single message. Other findings show that a gesture-speech system starts to operate from 16-18 months of age, and that coverbal gesture increases in use as the child gets older (Capirci et al., 2002; Goldin-Meadow & Butcher, 2003; Guidetti, 2003; Colletta, 2004).
How does this speech-gesture system develop in children ? Does the relationship between speech and gesture change with the use of new linguistic devices as well as new communicative behaviour ? Do other uses of gestures appear through late speech development, in other words, does discourse development evolve together with gesture development ?
The following perspectives may be explored :
-An interlinguistic and intercultural perspective, with observations from various countries, e.g. America, France, Italy, South Africa.
-A sign language perspective, with observations of social interactions between deaf children.
-A pathological perspective, with observations of children with oral language impairments and children with unilateral brain damage.

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Developmental Aspects Of The Relationship Between Speech And Gesture
In The Construction Of Narratives

Speech and gesture constitute different forms of representation of reality with relevant implications both at a psychological-cognitive and a pragmatic-communicative level. It is worth investigating how the relationship between the two modalities proceeds in relation to the development of psychological-cognitive and linguistic capacities, and with the growth and diversification of communicative needs. In the present study we investigate developmental aspects of the relationship between speech and gesture in the construction of narratives. We focus our attention on how children develop competence in speech and gesture and, at the same time, the ways in which they integrate them in the elaboration of the narrative. A group of children from 3 to 10 years was videotaped during the telling of a video cartoon to a familiar adult. All of the children's speech and gestures were transcribed. Gestures were analysed in terms of the accuracy of execution and content representation, type
 s of representational strategies employed, and the semantic, syntactic and temporal relation to speech. Speech was coded for phonetic accuracy, grammatical correctness and semantic precision. Results indicated that the production of speech and gestures became more accurate both in mode of expression and in content representation. In addition, the ability to integrate speech and gesture in the semantic and syntactic structures of utterances increased with children's age. In sum, these findings may provide evidence for the presence of a general semiotic competence, founded on cognitive and neurological factors, that underlies both speech and gestures.

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Multimodal Explanations In French Children Aged From 3 To 11 Years

Following two investigations on the development of discourse and gesture abilities in speech production, a video corpus of 500 explanations was built. This corpus was performed by children in a French primary school aged from 6 to 11, and by children in French nursery schools aged from 3 to 6.

Explanation behaviour occurs when the speaker answers to a why-question, whether this question was explicitly asked or not. More precisely, explanation behaviour occurs when the speaker talks about an explanandum (event or behaviour needing an explanation) and is actually performing an explanans, i.e. giving a cause or finding a reason to explain this event or behaviour (Veneziano & Sinclair, 1995). Every occurrence of such behaviour was transcribed by at least two different persons as a mean to control the exact words pronounced by children. Coverbal gestures were also described on these transcriptions, after identification and classification (Colletta, 2004).

It was hypothesized that age should have an effect on both verbal and coverbal behaviour. The effect on verbal behaviour was expected on the basis of the following hypothesis. Explanations performed by young children have simple speech acts properties : they are framed and sustained by the conversational context and are inevitably short. On the other hand, explanations performed by adults, whether written or spoken, often have complex

speech acts or discourse properties : they need at least two sentences linked by explicit (or implicit) connectives and are built on an intrinsic coherence. Thus, the age period from 3 to 11 should appear as a transition from simple to complex explanations, attesting the increasing ability to generate speech at a discourse level (Hickmann, 2000). The effect on coverbal behaviour was expected on the basis of gesture and non verbal development research. If speech development really means multimodal development, the increasing ability to generate explanations should go hand in hand with an increasing use of coverbal gestures.

In order to test these hypotheses, we measured the effect of age on the duration and textual structure of explanations, and the amount of verbal information, sentences, connectives and coverbal information. All these measures show a remarkably regular evolution of explanation behaviour, both on its verbal and non verbal components, from the age of 3 to 11 years. We also analyzed the coverbal gestures used by children during their explanations. Over 50% of these gestures are gestures of the abstract (McNeill, 1992). This finding suggests that the ability to perform multimodal explanations appear as as a window into discourse development as well as into the emergence of abstract thought.

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Gestures And Speech In The Preschool Years : A Multimodal And Pragmatic Approach

The aim of this paper is to shed light on the multimodal aspects of communication in young French children using a pragmatic approach. More precisely, the purpose is to analyse both verbal and non-verbal forms and functions of communication in 3 to 5 years-old children observed in two contexts : at school and at home and facing two interlocutors : a familiar or an unfamiliar adult. At school, children had to tell a story to their peers and at home, they had to tell two stories to an experimenter, one after watching a short video clip and one from the French classics they know; they also had to tell what happened in their school day to their parents. The transcription and coding take into account the forms of communication as conventional and co-verbal gestures which can or not be combined with words, verbal utterances, combined utterances (gestures and words). The functions of communication are coded on the basis of an adaptation of the speech act theory (Searle & Vanderveken, 1985) into assertives, directives, expressives and engagements.

Results indicate a decrease in the production of pointing compared to earlier studies done in younger children (Guidetti, 2002). They also show a diversification of the repertoire of the produced gestures for example, children count with their fingers. For the conventional gestures, the most frequent category is the agreement gestures category. There are differences in the production of some gestural or verbal forms depending on the adult who is facing the child. The most frequent function produced is the assertive function.

Implications of these findings for communicative and linguistic development will be discussed in relation to other research in the domain of developmental pragmatics.

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Multimodal Discourse Development In Isizulu And French

Gestures, postures, eye-gazing and other body movements have been proven without doubt that they are a part of the communication process (McNeill, 1992; Streeck & Knapp, 1992). "Willingly or not, humans when in co-presence, continuously inform one another their intentions, interests, feelings and ideas by means of visible bodily action." (p.1, Kendon. A, 2004).

In all languages of the world, children are required to relate to the „forms and functions of language (Hickmann, 2003). How is this demonstrated? At what point do children perform the complex pragmatic function that is performed by the adults? Is the development universal, i.e. what role does culture play in the acquisition from a multimodal perspective? It is from this premise that our interest is focused on understanding the acquisition of discourse in the form of interactive narratives of children between the ages of 6 to 12 years. Departing from the extensive research of multimodal discourse development of this period in children development by, to name a

few, (Colletta, 2004; Guidetti, 2003) we seek to observe the multimodal principles of discourse organisation of isiZulu, seSotho (Bantu languages) and French children during the developing years of 6 to 12 years.

The main questions we ask ourselves are:

1. At what age do the Zulu, Sotho and French child produce complex narrative performance?

2, What impact do language grammatical structures and semantic categories have on the gestures of these languages?

3. What difference is there in the use of co-verbal gesture and what role does culture play?

To respond to our questions, we have selected children between the ages of 6 through to 12 years who are native speakers of isiZulu, seSotho and French and given them narrative tasks. Our methodology is one that has been used by several gestualists for similar tasks (McNeill, 1992; Kita & Özyürek, 2003), in which the children are shown an animated cartoon and then asked to re-tell the story of the film. A second task is to give an account of any story known to the child. Children are also prompted to answer specific questions based on the cartoon so further analyse their discourse proficiencies.

To respond to our second question, the spatial, temporal, aspect, word order of each language will be examined especially when gesture occurs. Motion event packaging will be analysed, i.e. do the gestures incorporate information on the "path of movement" or is "path information conveyed by particles and prepositions" (Talmy, 1991).

Lastly, we will compare the multimodal accounts of the three groups of children: French children from Grenoble (France), Zulu children from Kwa-Zulu Natal as well as Sotho children from Bloemfontein (both in South Africa).

From their performances, we seek to discuss how children they regulate linguistic and non-linguistic devices to formulate, convey and regulate discourse flow from a cross-cultural perspective.

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3:30-6:00 Parallel sessions

Session 3A: FORM & MEANING (Concert Hall)

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Linear Structures Of Gestures: Co-Speech Gestures As Self-Embedding Constructions

The main goal of this presentation is to show that co-speech gestures can be described as self-embedding syntactic constructions. My claim is that both, linear structures of vocal language and co-speech gestures, have a share in recursivity which is considered a property specific for language only. Its second goal is to provide a linguistic metalanguage for describing linear or syntagmatic structures of gestures which is consistent and based on tools used in formal syntax of vocal language. My proposal for a formal representation consists of a constituent structure and a feature structure (Eisenberg 1999) which allows the allocation of values of gestural form parameters (e.g Bressem 2006, in prep.) to the final constituents of the constituent hierarchy. The application to empirical examples shows that categories of gestural units and subunits (Kendon 1972, 2005; Kita et al. 1998; Müller/Fricke/Lausberg/Liebal 2005; McNeill 2005; Tag 2006; Fricke 2007, in prep.) like primary and secondary gesture units, simple and complex strokes (repetition, reduplication, and variation) can be reconstructed and defined formally in terms of constituency and feature values (Fricke in prep.).

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Metonymy, Metaphor, And Pragmatic Functions: A Case Study Of A Recurrent Gesture

Following a linguistic and functional approach as described by Müller (1998, 2004) this talk will present results of a qualitative study of a recurrent pragmatic gesture prominent in Spanish everyday conversation: the "brushing

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aside gesture." It will be argued that this gesture is based on an everyday action or "manipulation" (Streeck 1994), which consists of brushing small, annoying objects aside. The gesture is linked to this action through iconicity: a quick flick of the hand away from the body is carried out, using the most prominent formal feature of the basic action. Other more or less implicit characteristics of the action, such as the objects which are brushed aside, the attitude of the actor/speaker towards these objects and the goal of the action (finishing an unpleasant state of being) are transposed metonymically into the realm of communication by using this gesture. The transformation of the action into a gesture, now acting upon speech, has been regarded as an expression of the underlying conceptual metaphor IDEAS (OR MEANINGS) ARE OBJECTS (Lakoff&Johnson 2003; McNeill 1992, 2005). Even though this conceptual metaphor appears to be essential for many "pragmatic gestures" in the Western World, it does not account for all facets of these gestures. It will be concluded that conceptual metaphor does not fully explain the pragmatic functions of the "brushing aside gesture." Rather we need to also consider the pragmatic characteristics which metonymically link the gestural performance to the practical action in order to fully grasp the variations in pragmatic functions observed in this gesture. In order to understand these phenomena one should examine recurrent gesture forms using functional analyses and different types of discourse.

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Recurrent Form Features In Coverbal Gestures

While the leading assumption in gesture research assumes that gestures' forms are random implementations of individual speakers (McNeill 1992, 2005), the analysis to be presented in this talk shows that German speakers use specific hand shapes, orientations of the hand, movement patterns and positions in space recurrently. Contrary to the belief in chance, the study makes evident that speakers of German dispose of basic standardized gestural forms on which they fall back in gesturing. Based on data of naturally occurring conversations in dyadic situations, and an analysis of coverbal gestures independent of speech focusing solely on external features, I will demonstrate that German speakers use particular gestural forms recurrently. For instance, 32 different hand configurations were identified in the data, but only 6 hand shapes were used repeatedly. Likewise, out of 13 different orientations of the hand just 5 were used recurrently by the speakers. The analysis thus shows that while having a variety of forms at hand, speakers only use a limited set of shapes for their gesturing. My analysis thus supports linguistic approaches to co speech gestures (Müller, Lausberg, Fricke, Liebal 2005), prepares the ground for further research on possible form-meaning pairs of gestural parameters (cf. Kendon 2004, Müller 2004), and is thus a necessary complement for analyses on the interaction of gesture and speech in constituting meaning.

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Compositionality In Gesture: Structured Real Space Blends

Spontaneous (non-quotable) gesture is very hard to interpret without accompanying speech. As McNeill (1992, 2005) and others have pointed out, it is global or synthetic: meanings of the parts depend on interpretation of the whole. Languages are understood to be analytic and compositional; signs, like spoken words, have conventional meaning and components (hand-shape, motion, location).
However, following Calbris (1990), and Kendon's (2004; cf. Müller 2004) analysis of gesture families and of gesture-sign spatial parallels, I view aspects of gesture as conventional and parameterized, sometimes in compositional ways. Cienki (1998) cites a gesturer using the same vertical dimension to refer to good vs. bad grades (on one side of himself), and to good vs. bad moral behavior (on the other side). The mapping of vertical space onto GOOD/BAD is a systematic and conventional parameter of these gestures, separable from choice of location or hand-shape. Núñez and Sweetser (2006) show a similar back-front meaning parameter in time gestures. I use videotaped lecture and interview data to show that, as much spontaneous language is "prefab," so many non-conventional spontaneous gestures are pre-structured by conventional parametrizations of the gesture space, like UP/DOWN=GOOD/BAD, or BACK/FRONT=FUTURE/PAST.

Further, to reveal systematic structures, one must tease out the prosodic, iconic (including metaphorically used icons), and indexical aspects of meaning that are frequently co-present in one gesture. Sizemore & Sweetser (2006) note that gesturers generally represent temporal process development as motion (iconic/metaphoric) away from self (indexical --the viewpoint of the agent as origin is taken). This convention is superimposed on speaker-addressee physical space, also available for indexical use. In one example, a lecturer says he will stop talking, and metaphorically cuts off the talking process with a cutting gesture parallel to the front of his body (cf. Kendon's (1995) STOP gesture). But he cuts with a pointing hand, pre-formed for a following indexical point at the audience as he says interact with you, and then for a temporal point at the floor as he says I'll do that here (="now"). This STOP gesture has rich conventional componential structure, even though its
 interpretation depends on accompanying speech.

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When Gestures Repeat—Imagery, Morphology, and Priming

Recurrences of gesture form have different properties, depending on whether the gestures are sign-like or spontaneous. The non-morphemic status of spontaneous gestures in Canary Row narrations is clear. Even with extensive repetition there are none of the hallmarks of morphology—no streamlining changes of form, no ritualization, and no contrast to other gestures. Repetition in these cases is plausibly due to recurring imagery, a gesture is born each time anew—a phoenix, not a morph. Other repetitions may due to priming, a memory process whereby the weight of previous instances makes further occurrences likely in a way that does not suggest any connection with encoding.

In a different collection, the Snow White corpus, in which a subject is retelling a fairytale exclusively with gestures, no speech allowed (the Ralph Bloom study), two gestures (King, Queen) contrasted immediately. The signs then showed substantial changes as they were used during the narration. Thus ritualization was apparent and stemmed from the contrast, rather than produced it. The changes increased fluency but the Queen-King contrast never disappeared and was even adopted by the 'listener'. In the CR corpus, on the other hand, recurring forms did not contrast and could be replaced at any time by unrelated forms. The new forms were propelled by iconicity, not by relationships to other forms, and the old forms, unlike the SW morphemes, simply disappeared without trace.

A factor determining whether gestures are sign-like or spontaneous may be the speaker's self-awareness of the gestures, a clear difference favoring SW.

Session 3B: INTERCULTURALITY (Rehearsal Room)

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Patterns Of Thinking For Speaking, Years Later

Thinking for speaking refers to thinking that occurs on-line in the process of speaking. Slobin (1991) has proposed that in first language acquisition, children learn a particular pattern of thinking for speaking. Cross-linguistic research on motion events has shown that Spanish speakers and English speakers have different patterns of thinking for speaking about motion both linguistically and gesturally (Slobin, 1991, 1996a, 1996b, 2003, 2004; Berman and Slobin 1994; Slobin and Hoiting 1994; Stam, 1998, 2006; McNeill and Duncan, 2000; McNeill, 2000; Kellerman and van Hoof, 2003; Neguerela et al., 2004; Schulman, 2004). Spanish speakers express path linguistically on verbs, and their path gestures tend to occur with path verbs, while English speakers express path linguistically on satellites (adverbs or particles), and their path gestures tend to occur with satellites (adverbs, particles, or prepositions).   Given these different patterns, what happens when Spanish speakers learn English, do their patterns of thinking for speaking about motion change? Stam (2006) has shown that the English narrations of Spanish learners of English have aspects of their first language (Spanish) and aspects of their second language (English) thinking for speaking patterns, but do these patterns change over time? In this paper, the presenter will

discuss a follow up study she conducted on an English language learner, who was at the advanced level when originally videotaped and who was just beginning to accumulate path components in speech, to investigate how her thinking for speaking patterns about motion have changed since 1997. She will discuss how the subject expressed path linguistically and gesturally in her narrations in Spanish and English in 1997 and how she expresses path linguistically and gesturally nine years later.

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Representing Motion Events In Gestures With And Without Speech Across Languages

Previous research has shown that the co-speech gestures speakers produce when they describe motion events differ as a function of the language they speak (Kita & Özyürek, 2003; Özyürek et al, 2005). In particular, speakers of English, a satellite-framed language, tend to express manner and path within a single verbal clause; they also convey manner and path within a single gesture. In contrast, speakers of Turkish and Spanish, verb-framed languages, tend to express manner and path in two separate verbal clauses, and they also convey these components in separate gestures. Here we investigate whether these cross-linguistic differences persist if speakers are asked to describe motion events using gesture without speech (Singleton et al., 1999). We asked speakers of English (N=20), Turkish (N=20), and Spanish (N=17) to describe six different animated cartoons in their native language, and we examined the gestures they produced to convey manner and path. We also asked the speakers to describe the same events in gesture using no speech at all. Replicating previous studies, we found that Turkish and Spanish speakers were less likely to express manner in gesture and speech than English speakers and, importantly, were more likely to express manner and path in separate clauses and separate gestures than English speakers. However, we found no differences across speakers of these three languages in their production and packaging of manner and path when they produced gestures without speech. These results provide further evidence for the claim that the gestures produced along with speech are shaped by the way events are packaged for on-line linguistic encoding and thus reflect thoughts shaped by language (Kita & Özyürek, 2003). In contrast, when gesture is used without speech, it reveals thoughts that are not shaped by the speaker's language (Goldin-Meadow, 2006) and are thus the same across cultures.

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Multimodality And Multiculturality In Interpretation

The analysis of the relations between body movements and speech in interpretation offers an interesting research field for the study of both cultural and cognitive aspects of language production and perception. If we look at an interpreter in his booth, we often notice that s/he gesticulates though s/he cannot be seen by anybody. It is certainly another kind of situation than for instance a telephone conversation, where gesticulation also happens. The question is, how are the several communicative multimodalities used in the specific context of interpretation? Are interpreters' body movements influenced by speakers' body movements? Does the interpreter repeat any formal features of the movements made by the speaker? Does he use his/her own? Does s/he transfer culturally marked movements into movements used with the target language? After reading some articles on nonverbal

communication in interpretation, my first intention was to show how interpreters transfer nonverbally expressed and eventually cultural marked meanings into verbal forms of the target language. However, the registered corpus did not offer evident data to explore this phenomenon. Instead, other aspects came out to be of great importance to illustrate the processes of language (de)codification and transfer. To show these aspects, following steps were pursued: a) description of forms, functions and meanings of speaker's and interpreter's nonverbal modalities, b) description of the way these nonverbal modalities are related to words and prosody. c) description of nonverbal modalities used by the speaker to accompany speech and of nonverbal modalities used by the interpreter to accompany the transferred speech/the transfer process.   The micro-analysis of a few seconds of the speaker's speech and its interpretation is an attempt to understand how multimodality is used in the specific context of conference interpretation and which type(s) of conversational functions the different modalities can have.

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Language And Gesture: How One Effects The Other

There is strong evidence that speech and gesture form part of a system where excluding one would be ignoring half of the message (see McNeill, 2000). If we follow this idea and consider speech and gesture as two inseparable elements of one monistic semiotic system, the question is rather obvious: What happens when we change speech, when we use another language? Does gesture vary? Furthermore: assuming that particular languages shape our cognitive functions in particular ways, fostering different psychological conceptualizations of the same reality, the question is: Can we change the way we think through language, and, as a result of this, the way we gesture? Supported by Slobin's (1996) Thinking-for-Speaking framework, and Vygotskyan theory (see Lantolf and Thorne, 2006), this paper tries to answer these questions by studying the behavior of the speech/gesture interface in highly proficient bilingual speakers. Data presented comes from various observations of speakers' L2 performances depicting motion events (see Talmy, 2002) in English and Spanish. Findings address the relationship between speech and gesture as a way of inquiry on how language mediates cognition.

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Gesture And Language Shift On The Brazilian-Uruguayan Border

The linguistic outcome of language contact between Spanish and Uruguayan Portuguese (UP) is language shift, resulting in a structurally-mixed variety, Portunhol, which is paralleled by an apparent mixture in the repertoire of emblematic gestures that is both Uruguayan and Brazilian, culturally. Isolating those gestures that are distinct in Uruguay and Brazil and identifying the sociological factors of people who use them, this research will demonstrate that gesture is a related expression of language shift. As speakers move away from the stigmatized UP variety, motivated by pressure of the linguistic majority to conform to the Uruguayan standard, they abandon both UP language and culturally-related gestures. The intermediate outcome of this process is gesture mixture in the speech community.   One would expect to find that language shift in northern Uruguay is accompanied by a concomitant shift in non-verbal communication, given that emblematic gestures are culturally-specific, communicating both identity and meaning. With regard to verbal communication, the degree of language mixture is sociolinguistic in nature, with gender, age, and location being important factors. In rural and suburban areas, UP has been maintained, until recently, owing to limited access to education and speakers' relative isolation from the Spanish-speaking majority. However, with increased access to education and pressure from the majority to abandon UP in favor of Spanish for the socioeconomic advantages it promises, UP is converging toward a variety that is highly influenced by Spanish, while an increasing number of UP/Spanish bilinguals are socializing their children solely in Spanish. Also spurring the change is a desire by the UP-speaking community to show loyalty to the Uruguayan nation by abandoning the language associated with their Brazilian neighbor. Preliminary

indications reveal that gesture in northern Uruguay is undergoing shift, with a change toward those emblems associated with Uruguayan culture, resembling results of borrowing and code-mixing in speech.

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3:30-4:30 Parallel sessions

Session 3C: PANEL: LANGUAGE DEVELOPMENT (Part 2) (Recital Hall)
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Learning To Convey Linguistic Constructions In Gesture And Speech:
A Comparison Of Children With And Without Focal Brain Injury

At the one-word stage children use gesture to supplement their speech (eat+point at cookie). The age at which children first produce supplementary gesture-speech combinations predicts the onset of two-word speech (Goldin-Meadow & Butcher, 2003). Gesture thus signals a child,s readiness to produce multi-word sentences. Moreover, children continue to use gesture with speech to convey increasingly complex linguistic constructions (Özçaliskan & Goldin-Meadow, 2005). The question we ask here is whether children with unilateral brain injury would also use gesture-speech combinations to convey increasingly complex linguistic constructions before they can express them in speech, and whether the laterality of the injury would have an effect on their use of gesture to convey such meanings.

To explore these questions, we followed 18 American children with brain injuries (BI) to either the left or the right hemisphere, along with 40 typically developing American children (TD). Children were videotaped for 90 minutes interacting with their parents every four months, from 14-to-34 months.

Both TD and BI children increased their supplementary gesture-speech combinations over time. More importantly, the types of supplementary combinations changed over time and presaged changes in children,s speech. Both TD and BI children produced three distinct constructions (argument-argument, argument-predicate, predicate-predicate) across the two modalities several months before these constructions appeared entirely within speech. However, compared to TD children, BI children were delayed in their production of each construction type, and also showed lateralization effects in their gesture use such that children with right-hemisphere injury used gesture less than children with left-hemisphere injury. These findings underscore gesture as a window into children,s early sentence-making ability. Gesture may be helping children to become sentence-makers, even in the face of early brain injury.

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Gesture And Early Language Development In Children With Early Unilateral Brain Injury

Previous research shows that children with early unilateral brain injury (BI) do not show the same kinds and severity of language impairment as adults who have sustained similar injury later in life (Feldman, 2005). Thus, in the face of early brain injury there is marked plasticity for language functions. We ask whether language development proceeds in a typical manner in these children. by focusing on the relation of early gesture and early language development. Studies with typically developing children (TD) show that early gesture presages subsequent language development both at the one-word stage and during their transition to two-word speech

(Bates, O'Connell, & Shore, 1987; Iverson & Goldin-Meadow, 2005). We ask whether gesture is related to subsequent language development in BI children as well.
We followed BI (pre- or perinatal lesions of varying sites and sizes) and TD children from 14 to 30 months of age. For both TD and BI children, spontaneous speech and gesture measures were collected every 4 months during 90-minute, in-home naturalistic observations of child and a primary caregiver. Vocabulary and syntax comprehension measures were given to each child at the 30-month visit. Results show that for both TD and BI children, gesture and speech are related in that children's early gestures predict subsequent vocabulary and syntax comprehension measures. The finding that the relation between gesture and speech survives early brain injury suggests that these behaviors are drawing on overlapping resources that reorganize in tandem.

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4:30-6:00 parallel sessions

Session 3D: COMPUTATIONAL APPROACHES (Recital Hall)

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Studies on Behavior Expressivity for Embodied Conversational Agents
Our aim is to create affective embodied conversational agent able to display expressive behaviors. Expressivity refers to the manner of execution of a behavior; how large an arm gesture is, how powerful, how fast the stroke is, etc. Our model of behavior expressivity is based on perceptual studies by Wallbott (1998) and Gallaher (1992). Six dimensions have been defined that act directly on the behavior phases. For an arm gesture, spatial extent modifies the wrist position making the arms more or less extended in space; temporal extent specifies the speed of the stroke, that is the speed of the wrist movement during the stroke phase; power acts on the acceleration of the stroke; fluidity specifies if consecutive gestures are continuously or hectically coarticulated one in another; repetitivity repeats the gesture stroke; and finally overall activity is related to the overall number of gestures. We have applied this model in a number of exploratory studies. In some of these studies the values of the expressivity parameters were computed automatically using image analysis technique; in other they were extracted from manual annotation of video corpus. Expressivity values may act over the whole animation of the agent; they may be changed at every instant of the movement to make an agent react instantaneously to some data stream; they may get different values on every gesture or even on a particular phase of the gesture. These exploratory studies are based on various data types: video corpus of acted data or real data, 2D cartoon animations, literature survey. One of our research issues is to study behavior representation: finding what information needs to be encoded, at which levels of representation does a behavior need to be described, how to encode dynamism in behavior. Another aim is to use the result of these exploratory studies to refine the implementation of our expressivity model.

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Head Movements: Forms And Functions
In "Some uses of the head shake," Kendon not only provides an interesting classification of a collection of example of head shakes and a host of observations and cursory remarks that provide insight into their function. He calls his investigation into the use of the head shake and the resultant classification, preliminary. There are a number of aspects of head shakes that this paper explicitly does not or hardly cover, one of which is the variations in form of the head shake and the possible pairings of the forms with the functions. McClave's paper on the "Linguistic functions of head movements in the context of speech" has a bit more to say about the various forms of the head movements for each of the functions she lists, but also in this case, the form was not covered in depth and relations were not systematically studied. In several papers by Hadar and colleagues ("Head movement during

listening turns in conversation" and "Kinematics of head movement accompanying speech during conversation," to mention just two), on the other hand, formal features were investigated in greater detail and an attempt was made to link these to differences in context and function. These are interesting studies but still just probes in this enormous landscape. Many of the contexts that are discussed in the papers by Kendon, McClave and others remain unexplored with respect to the fine-grained analysis of formal features. In our effort to build artificial agents able to produce back-channel and other expressive behaviours in response to real-time input of a human speaker, we have collected a mixed corpus of interactions to study the variations in form of head movements and the relation to their meanings. We annotated fragments with a "meaning"scheme with classes based on the work of the afore-mentioned authors and others and analysed the movements using the output of a head-tracker. Our study covers the analysis of head movements of speaker and hearer in interaction. We examine the speed, magnitude, and direction of the movements in the three planes. We pay special attention to the composition of head movement in time: the way they combine to form complex units. In this way we hope to fill some gaps in the existing knowledge on the relations between the form that head movements take and what they express.

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Locating Objects By Pointing

According to the prevalent view, "The prototypical pointing gesture is a communicative body movement that projects a vector from a body part. This vector indicates a certain direction, location, or object" (Kita, 2003). But pointing is also dialogic, since it requires an addressee who extrapolates the pointing vector, intersects it with a potential target and thereby comprehends its referent (Butterworth, 2003). Extrapolation makes indicating by pointing a fuzzy process. "Thus," Butterworth and Itakura (2000) conclude, "if there is vector extrapolation it is at best approximate and sufficient only to differentiate between widely spaced, identical objects." Given a situation where there are not "widely spaced, identical objects," the vector does not single out an object; it rather restricts the candidates for potential targets. Is there a way to make the fuzziness inherent in the vector extrapolation process explicit? Is it possible to distinguish between potential and impossible targets of a pointing gesture? Going beyond vector extrapolation, we propose a model for pointing that not only incorporates the fuzziness of the vector extrapolation approach but also frames a pointing's potential targets. The model we propose is the geometrical model of the pointing cone (Kranstedt et al., 2006b). How does this geometrical structure relate to deictic behavior? The possible targets of a pointing gesture, its semantic extension, are the objects that lie in the conic section that is given by the cone meeting a surface. In order to "measure" the size of the cone, we conduct an experimental study. The methodological approach pursued consists in an integration of audio, video, and body movement recordings in a restricted, task-oriented object identification game setting (see Kranstedt et al., 2006a). The data gets augmented with human annotation. First results show that the pointing cone is indeed a suitable model for pointing gestures in a restricted object domain.

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9:00-10:30 Parallel sessions

Session 4A: PANEL: CODING & ANALYSIS (Concert Hall)

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Coding And Analytic Schemes In Gesture Research

This thematic panel focuses on the methodology of coding and analysis in gesture research. Coding and annotation of gesture lies at the heart of research because the theoretical assumptions, underlying categories and analytic schemes shape the analysis, with different coding schemes possibly leading to different results. Many researchers have put effort into developing coding and analysis schemes that can be used systematically and reliably. The decision to use an existing scheme, to develop a new scheme or to modify an existing is driven by the research question but also by the knowledge of existing schemes, their applicability and their limitations and strengths. Since gesture has been studied by researchers in diverse fields, the existing schemes vary in their underlying goals and assumptions. The panel consists of presentations of coding and analytic schemes by experienced researchers representing different approaches. The presentations involve a basic introduction to categories and analytic schemes and their applicability to different kinds of research questions, as well as a discussion of the theoretical assumptions underlying them. The aim of this thematic panel is twofold. On the one hand, it should provide an informative platform for the practitioners in the field to get acquainted with other researchers' approaches and techniques. On the other hand, by bringing practitioners together from multiple perspectives the panel should provide a starting point for a discussion about the schemes, their strengths and limitations, the underlying theoretical assumptions, as well as how these assumptions might influence the findings.

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A Social Approach To Gesture Use

Our research group takes a social approach to gesture use, investigating the function that each gesture serves at the precise moment it is used in the conversation. We are interested in gestures' communicative function, whether social or semantic. A functional approach directs us away from rigid taxonomic distinctions between mutually exclusive types of gestures. A gesture can serve more than one function, and two seemingly identical gestures can serve different functions, depending on their context. Systematic variations in gesture form, orientation, location, and meaning (especially in relation to words) can be indicators of function. A functional analysis requires considering the gesture's immediate context, including the conversational purpose at that moment, the accompanying utterance, the actions of both participants, and their prior and subsequent utterances. Analyzing gesture function does not have to be a subjective venture: It is possible to create a reliable scheme for analysis. We derive such schemes (including definitions and detailed procedures for analysis) inductively from a subset of the data and then apply them systematically to the rest of the data. Thus, instead of being limited to any a priori, conventional scheme, we tailor the analysis to fit the focus for the study and the nature of the data. We have used this approach, for example, to (1) identify the difference between topical and interactive functions of gestures, (2) derive the semantic function of gestures and their relationship with the words (i.e., redundancy), (3) show the role addressees' gestures play in grounding (i.e., updating and establishing understanding) with the speaker; and (4) reveal that gestures that appeared to be badly formed and executed were, in fact, strong indicators of common knowledge the participants shared.

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A Neuropsychological Gesture Classification (NGC)

The neuropsychological gesture classification (NGC) has been developed on the basis of gesture types and categories which different gesture researchers had agreed on (Efron, 1941; Freedman, 1972; Ekman & Friesen, 1979; McNeill, 1992; Davis, 1997). In addition, the NGC includes gesture types derived from neuroscience research. While previous classification systems were developed on the basis of gesture observation and their categories are heuristical, the NGC brings together the phenomenology and the neurobiology of gestures. The theoretical assumption behind the NGC is that its main categories represent different cognitive or emotional functions and thus, that they are generated in different locations in the brain. The validity is examined with split-brain studies and functional Magnetic Resonance Imaging (fMRI) studies.

The NGC consists of five main categories which refer to the function of a gesture in the communicative context. Each main category contains several gesture types each of which is defined by a specific combination of formal aspects including hand shape, hand position, path (Ochipa et al., 1994; Lausberg et al., 2003a), efforts, planes, kinesphere (Laban, 1988; Dell, 1979), gesture space (Lausberg et al., 2003b), involvement of body parts other than hands, gaze pattern (Gullberg & Holmquist, 2006), and the gestural mode of representation (Müller, 1998). The objectivity of the gesture types is high (rater agreement Cohen's κ .87).

The NGC enables to classify gestures based on their kinetic features alone, i.e., without sound. As a behavioural method, the system can be used for a broad range of test designs ranging from the examination of spontaneous gesture production in everyday conversation to the structured elicitation of gestures by stimuli. Because of the broad spectrum of phenomena that can be coded, the high objectivity, and its adaptation to movement analysis software (e.g. ELAN), the NGC can be used for qualitative and quantitative research.

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They Know What They're Saying:
The Role of Native Expertise in Coding Gesture Cross-Culturally

This panel paper explores interpretive and structural coding challenges that surface when it becomes necessary to expand an established gesture coding system to make sense of gestures from a language different from that in which the system was originally developed. Such challenges prove to be fruitful loci for expanding our understanding of how gesture carries meaning within the contexts of different languages and cultural worlds. In particular, I start by describing the Goldin-Meadow coding system and what it was originally developed to analyze. I then describe how current cross-cultural work can effectively extend this system through expanded or new coding categories in order to consider and interpret meanings not previously considered because they do not exist in the gestures that accompany American English. My goal is to explore how moving beyond our native linguistic world encourages us to recognize that coding paradigms, if left unchallenged, risk assuming a universality of categories and structures that might actually be specific to a particular linguistic world view. I suggest that the ethnographic study of language and gesture in context allows us to expand upon and elaborate existing categories to increase the rigor and flexibility of coding methodology, analysis and interpretation. Native (or near native) expertise emerges in the context of cross-linguistic and cross-cultural work as a key resource for both challenging the assumptions behind our coding systems and expanding them so that they can take full advantage of native speakers' knowledge of the meanings that their gestures encode without sacrificing the validity of the system.

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Session 4B: MEANINGS MULTIMODALLY (Rehearsal Room)

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The Grammar-Gesture Nexus: How Grammatical Meaning Receives Multimodal Expression

The idea of a *grammar-gesture nexus* has emerged from our audio-visual corpus established in order to examine what gestures might typically occur with core grammatical processes in English (e.g. assertion, negation, quantification, topicalisation, etc.). The gestures we have observed are organized into recurrent patterns and appear to be governed by convention. It is suggested that these gestural forms, hitherto referred to as 'pragmatic' gestures (Streeck 1993, Kendon 1995, 2004, Müller 2004), allow speakers to code, organise and share their concepts in ways similar to the established grammatical forms and structures simultaneously employed through speech.

The purpose of this paper is to (a) extend and build on earlier work on the so-called 'pragmatic' gestures, (b) present the first step in a systematic analysis of gestures in view of the grammatical processes with which they occur, and (c) suggest analogues between conventional forms and patterns across modalities. The main issue, we will argue, is that the expression of grammatical meaning is in fact multimodal. Critical to this analysis, and thus to our formulation of the *grammar-gesture nexus*, are wider notions and tools developed in cognitive grammar. These include construction approaches to argument structure (Goldberg 1995), cognitive characterization of linguistic structure (Langacker 1991b, 2000), embodied experience- and conceptualisation-based approaches to language (Heine 1997; Lakoff and Johnson 1980, 1999) and cognitive grammars of substance, contact and manipulation (Lapaire 2006a,b).

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How Do Speakers Describe Static, Locative Relationships In Australian English?

While previous research has investigated how speakers use language and gesture to encode the semantics of dynamic motion events (i.e. Kita & Özyürek 2003), very few studies have considered the spatial domain from the perspective of static, locative events: how do speakers encode such events in speech and gesture? This paper presents new research which applies this question to a study of native speakers of Australian English. After a brief presentation of the research project, I concentrate on a particularly interesting phenomenon noted during the data analysis, which I will call the *information fusion*. An information fusion is the parallel encoding, in speech and gesture, of two different pieces of locative information in a clause. The speaker uses a spatial preposition to locate one entity (the *figure*, following Talmy 2000) in relation to another entity (the *ground*, Talmy 2000), while also using gesture to encode a different piece of locative information about this figure/ground relationship. One example from the data is a speaker who describes a satellite dish as being *on top of* a hotel, while using her right index finger to point across *to the left*: she therefore uses speech to encode direction on the vertical axis, while simultaneously using gesture to express direction along the lateral axis. Far from being the contradictory association of two disconnected spatial ideas in speech and gesture, I show that such a speech/gesture fusion actually allows the speaker to simultaneously reveal two different aspects of a single figure/ground relationship. Research has already established that speakers use gesture to encode salient, unlexicalised spatial information (cf. Emmorey & Casey 2001). I support this finding by arguing that the encoding of locative semantics is a task realized in both verbal and gestural channels of communication. This task is streamlined by each channel's focus on a different spatial idea, both of which are linked through their description of the same locative relationship.

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The Crank Gesture - Systematic Variation Of Form And Context

This talk will focus on a form-based reconstruction of three variants of one recurrent gesture: the continous circling motion of the loose hand, which we term the crank gesture, because of these movement characteristics. A recurrent gesture is used repeatedly in different contexts and its formational and semantic core remains stable across different contexts and speakers. As Kendon (2005) and Mueller (2004) have pointed out, variations in form and context of use lead to functional extensions of a recurrent gesture. The Palm Up Open Hand, for instance, can be used to "offer a discursive object as a possibly shared one and invite the interlocutor to join in the perspective offered on the speaker's open hand." (Mueller 2004: 233). In contrast, it can be used with a repeated downward motion to present "the idea of listing offers" (ibid.). In this talk it will be argued that apart from hand shape, orientation and movement, additional form features can modify the function of a recurrent gesture. More specifically, it will be suggested that also the position of the gesture and the size of the continuous circling motion may go along with a systematic variation of context and function.

The quantitative analysis of the crank gesture is based on seven hours of video-recorded conversations in naturalistic settings. The crank gesture is often used in a context of a description or a request. However, it is primarily used in the context of a word/concept search. In these contexts three distinct forms of the crank gesture were identified: When used in a description it was prototypically performed in the gesture space "periphery upper right" to "center right" (McNeill 1992: 89). When used in a request the crank gesture was prototypically positioned in the same gesture space but it was performed with a large movement. In its primary context, the word/concept search the gesture was prototypically positioned in the gesture space "periphery upper center" to "center-center" (ibid.). These three variants thus differ significantly in two form feature namely position in gesture space and size of motion.

To conclude, a form-based analysis of the crank gesture reveals a systematic variation of form and context and it suggests that in analyzing formal variations of one recurrent gesture it is crucial to describe not only movement, hand shape and orientation but to apply a more differentiated coding scheme (cf. also Becker 2004 and Bressem 2006).

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Session 4C   PANEL: SPEECH-GESTURE ALIGNMENT (Recital Hall)

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Speech-Gesture Alignment

The project Speech-Gesture Alignment focuses on the investigation of iconic and referential gesture concurrent with speech in route description dialogues. Our research is in many ways inspired by work inaugurated by David McNeill, Justine Cassell and their co-workers combining several methodologies:
(a) experiments in the psycho-linguistic tradition using VR-technology,
(b) classical corpus annotation integrating VR-simulation as an ancillary device,
(c) statistical investigation,
(d) semantical and pragmatical description of structures and, finally,
(e) simulation of speech and iconic gesture production in the embodied agent Max.
Above all, (a) to (d) are concerned with speech and gesture-structures, information about the morphology of gesture tokens, and timing facts. They serve as a basis for describing the function of gestures, their overall meaning, the set-up of multimodal content and, most importantly, to inform the simulation. Simulation of speech-accompanying iconic gesture (e) is our main field of application. It is on the one hand theory-bound and serves as

a test-bed and falsification device for (a) to (d) on the other hand. The semantical and pragmatical description of structures (d) proceeds from linguistic structure and gesture morphology, maps gesture morphology onto depictional content and finally into meanings suited to interact with verbal meanings. Aligning interactions will be achieved via a common representation or via context modeling techniques. Here the relevant background methodology is dialogue-oriented dynamic semantics, underspecification theory and Neo-Gricean pragmatics. At this workshop we present
- our Empirical Study,
- our Annotation, Preliminary Gesture Typology and Reconstruction of Gesture Meaning,
- and our approach to Simulating Speech and Gesture Production.

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Annotation, Preliminary Gesture Typology and the Reconstruction of Gesture Meaning

This part of the talk hooks up to our description of the experimental setting, especially the VR stimulus, the raw data generated and the on-going "rough" annotation of the corpus. Initially, working hypotheses concerning the notion of meaning used for the speech gesture interface are given. In essence, we use customary concepts like reference and denotation and assume properties of meaning such as compositionality and vagueness. Indeed, the very assumption of a speech-gesture interface is founded on compositionality.

Based on the annotation we point out that gesture accompanies all levels of the content communicated from partial word meanings to dialogue structures and the depiction of situations. Annotation also provides the criteria and categories of our incipient typology. Criteria are for example handedness and the number of objects depicted. Categories comprise deictic reference and single semantic features. The ensuing section discusses reconstruction principles for a gesture speech interface. Various cases exemplified by empirical data are dealt with: Gesture features replicate features of word meaning, when the gesture features overlap with the set of features of the word meaning. Gesture can also add information to underspecified word meaning, if so, we can unify both meanings. Often, gesture meaning cannot be amalgamated with some particular word meaning, since it works like the full meaning of a constituent, say an adjective phrase or a clause modifying a noun. In rare cases, gesture contributes full propositional content.

Gesture can also accompany self- or other-repair, resulting in a revision of a proposition. Finally, gesture meaning sometimes captures objects and relations of dynamically developed situations.

All these observations demonstrate that the speech gesture interface works from the word level up to the description of situations.

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Simulating Speech And Gesture Production

In the computational modeling of multimodal communicative behavior the generation of combined language and iconic gesture poses big challenges for semantic integration and meaning-form mapping. We will discuss existing systems as well as current empirical evidence in order to develop a simulation account of human-like speech and gesture production. So far, only the NUMACK system (Kopp et al., 2004) has applied systematic meaning-form

mappings in the formation of iconic gestures. It operates on an unified logic-based representation and taking similarity between a gesture's form and its referent's form as primordial in depictive gesture. This approach proved sufficient to generate a set of multimodal direction-giving instructions, but it could not account for the whole range of multimodal performances one can find in spontaneous instructions (Kopp et al., to appear). A crucial issue to consider is the coexpressivity of the modalities. Recent empirical findings indicate that the interplay between speech and gesture in forming multimodal utterances is complex and depending on a number of contextual aspects (Bergmann & Kopp, 2006). From a psycholinguistic perspective particularly the model proposed by Kita & Özyürek (2003), representing the Interface Hypothesis, seems to be able to account for the data. Based on this model we will draw conclusions as to how the design of computational models needs to go beyond the uni-directional three-staged process usually adopted in current systems. The resulting model will be implemented and tested in a simulation prototype based on our virtual human Max (Kopp & Wachsmuth, 2004). Building on previous work, it will turn active representations into multimodal behavior, and it will be extended to the distribution of information across modalities and gestural depiction strategies.

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Empirical Study

In our empirical study we follow the hypothesis that the similarity between a gesture's form and its referent entity is not the only driving force behind a depictive gesture. This is based on experience from a previous study on iconic gestures in direction-giving, which yielded only few, weakly significant correlations between the visuo-spatial features of a referent object and the morphological features of a gesture (Kopp et al., to appear). Thus we now aim at identifying (1) which features of a referent people select under which circumstances, and (2) what strategies they follow in representing them, and (3) how a particular gesture is shaped by that strategy and the selected set of features. In our experimental setup two interlocutors engage in a spatial communication task combining direction-giving and sight descriptions. This scenario is well-suited for systematically studying aspects of natural speech and gesture use requiring to communicate information about the shape of objects and the spatial relations between them. The stimulus is a model of a town presented in a Virtual Reality environment, affording better determination and experimental control of the content of messages. Another novel feature is that gaze and hand/arm movement data of the interlocutors have been captured using a motion tracking system (cf. Kranstedt et al., 2006). The movement tracking data supplements the annotation of video recordings in order to facilitate the extraction of statistically significant behavior patterns, e.g. the association between the features of gestures and referents will be analysed by correlation techniques. Further exploration of the data will rely on heuristic procedures provided by factor analysis and cluster analysis. The annotation itself will be evaluated by reliability assessment.

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Session 4D: DATA SESSION: SIGNING SPACE (Band Room)

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Interaction And Negotiation In An Extended Signing Space

In sign language conversation both lexicalised signs and gestures are used. Within the deaf community there are individuals who lose their sight and who start using tactile sign language. Tactile sign language are used through touching each others hands while using sign language. The language of deaf-blind people has only partially been described. Some studies have been done on the use on Tactile Swedish Sign Language (Mesch 2001), on Tactile American Sign Language (Collins 2004) and on the subjects of Tactile Norwegian Sign Language (TNSL) (Raanes 2006).

In this presentation I will focus on some phenomena found in conversation between deaf-blind users of tactile Norwegian sign language In particular, I will show examples where a participant in a conversation will use the interlocutor's hands and body as a place of articulation for their own utterances. Not only is the tactile contact between the hands between deaf-blind users of tactile Norwegian sign language a prerequisite condition to make the communication possible, but the touch and handling of the other person's hands creates the opportunity of forming gestures by using the interlocutor's hands and body.

This phenomenon is a new finding in the study of deaf blind persons' communication. The phenomena have been observed and analysed in a study combining conversation analysis and cognitive grammar.

To perform such gestures, a process of negotiation and interaction must be done. How to analyse the construction of meaning in such expressions will be discussed on the basis of some video examples from everyday communication between users of TNSL. The findings may enlighten part of the meaningmaking process in conversations in general.

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11:00-12:00 Plenary Session: Keynote 2 (Concert Hall)

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Embodied Communication with a Virtual Human

The aim of the ZiF research year on Embodied Communication (2005/2006) has been to launch and explore a new integrated and interdisciplinary perspective that accounts for the crucial role of the body in communication. The core claim of the Embodied Communication Perspective is that human communication involves parallel and highly interactive couplings between communication partners. These couplings range from low-level systems for performing and understanding instrumental actions, like the mirror system, to higher systems that interpret symbols in a cultural context. Going beyond the traditional engineering model of signal transmission, the Embodied Communication Perspective envisions a multi-modal, multi-level, dynamic model of communication. Rather than "exchanging meaning" in back-and-forth messaging, contributors co-construct meaning interactively, using all information available about the other's body and its relation to the environment. This perspective hence provides a novel framework for the study of gesture and forms of nonlinguistic interaction in multimodal dialogue and face-to-face conversation.

A particular goal of the research year on Embodied Communication has been to explore how the modeling of communication with artificial agents can advance our understanding of key aspects of cognition, embodiment, and cognitive processes in communication. Creating an artificial system that reproduces certain aspects of a natural system can help us understand the internal mechanisms that have led to particular effects. Virtual humans, i.e. computer-generated entities that look and act like people and engage in conversation and collaborative tasks in simulated environments, have become prominent in the study of communication. The idea of virtual humans acknowledges that natural communication is largely social and envisions future computer systems that are social actors rather than tools. Taking the virtual human "Max" as an example, the talk will outline some ideas how virtual humans can provide explanatory models in the form of behavior and process simulations and how they can help identify primitives and central mechanisms of embodied communication from a machine modeling perspective.

1:00-2:30 Parallel sessions

Session 5A: REFERENTS & COMMON GROUND (Concert Hall)

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Gesture And Discourse: How We Use Our Hands To Refer Back

Do the gestures that speakers produce when they talk vary as a function of discourse? We compared speakers' gestures produced when they introduce a referent for the first time, compared to when they refer back to a referent. Four adults narrated stories involving 2 people and several objects. We coded the speech and gestures of each adult, and focused on the gestures that accompanied nouns and pronouns used to introduce or refer back to referents. Speakers used the same types of gestures whether introducing and referring back (50% iconics, 20% metaphorics, 17% beats). We also classified a gesture as congruent or supplemental based on the majority of contentful aspects within a particular gesture. A spoken referent can be accompanied by a gesture that captures information that is congruent with the identity of the referent (e.g., soap in speech, and a hand shape depicting the shape of a bar of soap in gesture), or that, sometimes simultaneously, provides supplemental information which differs from the meaning of the spoken referent (e.g., soap in speech, and a directional path along which the soap was moved in gesture). Interestingly, speakers used their gestures differently in relation to speech. When using a noun to introduce a referent, speakers produced congruent gestures 75% of the time and supplemental ones 25% of the time. In contrast, when using a noun or pronoun to refer back to the referent, speakers produced congruent gestures only 30% of the time and supplemental ones 70% of the time. There were no differences between using a noun or pronoun to refer back. Hence, collapsing across the lexical forms (noun, pronoun) showed an interaction such that congruent information occurred more often when introducing a referent and supplemental information occurred more often when referring back. When a referent is new, speakers use gesture to reinforce the identity of the referent introduced in speech. However, when a referent has already been introduced into the discourse, speakers use gesture to supplement the referent conveyed in speech. We suggest that a speaker's gestures not only reflect the given-new distinction for the speaker, but that co-speech gestures also have the potential to provide listeners with on-line cues about whether a referent is new or presupposed.

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Given-New Attenuation Effects In Gesture Production

A current debate in the study of speech-accompanying gesture concerns the extent to which speakers take addressees' knowledge into account while gesturing. Some researchers propose that gestures are produced automatically by speakers to facilitate lexical retrieval or alleviate cognitive load (for-the-speaker view), while others propose that gestures are produced with the addressees' needs in mind (for-the-addressee view). In this study we try to distinguish between the two views by examining how speakers encode given and new information. In 20 groups of 3, one person retold the same Road Runner cartoon story twice to one partner (so the second retelling was to an Old Addressee) and once to another (New Addressee), counterbalanced for hypermnesia (Addressee1-Addressee1-Addressee2 or Addressee1-Addressee2-Addressee1). We compared the gesture space, iconic precision and distribution of gesture types for a given speaker across all retellings. Gestures produced in stories retold to Old Addressees were smaller and less precise than those retold to New Addressees, although gestures were overall attenuated over time. Converging findings come from the events realized, words, and details across retellings: speakers generally attenuated their retellings more to Old Addressees than to New Addressees.

We conclude that given/new attenuation takes place at various levels of representation that may lend themselves differently to adjustments intended for the speaker or the addressee. Gesture production, specifically, seems to be guided both by the needs of addressees and by automatic processes by which speakers do what is easier for themselves. Overall, the partner-specific adjustments we report in speech and gesture have implications for understanding the alignment of these modalities and extending the scope of audience design to include nonverbal behavior.

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Session 5B: SPECIAL SESSION: ETHNOGRAPHY OF GESTURE (Rehearsal Room)

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Camera, Discovery, Gesture

The program showcases works by two visual ethnographers of gesture: The sociologist and "camera ethnographer" Pina Elisabeth Mohn (Berlin) researches the "body pedagogic" (*Lernkörper*) in multi-ethnic classrooms, and her camera, quietly moving about, discovers the hands of children disclosing the hidden affordances of learning and writing tools, collaborating over books and worksheets, and idling after their owners have failed to get the teacher's attention. The visual anthropologist Annie Comolli (École Pratique des Hautes Études, Paris), who was trained by Jean Rouch, investigates gestes du savoir (gestures of knowledge): actions of the hands that are indispensable in contexts of apprenticeship, e.g. learning to play the violin or acquiring the techniques of house-keeping.   The work of both videographers is characterized by an intense focus on the work of the hands, both practical and communicative; by the liberated, yet calm, "deconstructive" motions of the camera; and by the penetrating and imaginative reflection of filmic representation. I will show extensive segments of the films/videos by Mohn and Comolli, interpret these in light of their theoretical and methodological writings on filmic representation in research on social action, gesture, and apprenticeship, present them as examples of a diversified and reflective ethnographic research practice, and consider the insights into gesture that this unconventional mode of doing research can yield.

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Session 5C: INTERACTION AND ENACTING (Recital Hall)

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Gestural Expressions Of Emotion In Human Interaction

We aim at studying expressive gestures during a human-human interaction containing emotional phases.   We defined a protocol called EmoTABOO. We used it for the collection of a video corpus of multimodal interactions between two persons during a game. In each session, one of the two players has to guess the word that the other player is describing using speech and gesture (without uttering the secret word and 5 other forbidden words listed on a card).   We collected eight hours of videos (face close-up and upper body of each of the two players). One player was a naive subject, whereas the other player was a confederate instructed to elicit emotions in the other subject using various strategies in the aim to collect enough emotional behaviors (e.g. he might not find the word

on purpose).   We recorded 10 pairs of players, each pair involving 20 word cards which have been chosen for their capacities to elicit specific emotions (e.g. unknown word to elicit surprise or embarrassment) and iconic gestures (we chose words that are easy to mime like "to roast"). For the annotation of gestures, we defined a coding scheme, implemented in Anvil (Kipp 01), integrating expressivity and other classical dimensions of gesture annotation (gesture units, gesture phases, and gesture phrases).   Preliminary analyses (performed on four sessions of about two minutes each, with different pairs of subjects) show that 1) interactions between players are rich in terms of gesture (from 30 to 46 gesture phrases per session); 2) the corpus contains a variety of gesture lemmas (7 metaphorics, 5 iconics, 11 emblems, 3 deictics, 2 beats, 9 adaptators); 3)   there are imitation phenomena (from 1 to 4 depending on the couples). We will compute individual and dyad profiles by measuring the relations between the annotations of expressivity, gesture phases, emotions and interactivity.

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The Work of Enactments: Imitations of Bodily Conduct On-screen in Data Sessions

Video "data sessions" provide an interesting case study for those with an interest in bodily expression and gesture. They form a common workplace setting for video experts and practitioners who collaboratively analyse video, both in academic departments and in other professions (e.g. performance analysis, video forensics etc.). This research is based on video recordings of social scientific data sessions in practice. The different data sessions comprise of *focused gatherings*, during the early stages of academic work, between departmental colleagues or collaborative research projects/working groups across the extended social sciences. The positioning, orientation and movement of the body are important resources in order for data session participants to make sense of what is happening. For example, one way in which participants discuss on-screen conduct is through imitating or enacting that conduct. The design of these gesture sequences are not simply a re-production of the actions on-screen, but a version of events that often selects and exaggerates certain elements. This paper examines how participants, having noticed *something* from the video on-screen, set about having others see it and see it in a particular way through the use of enactments. Drawing on ethnomethodology and conversation analysis (see Garfinkel, 1967; Sacks, 1992), the paper looks at a series of such enactments and analyses how they are produced and coordinated with regard to the moment-by-moment co-participation of the data session members, and in relation to the limitations/affordances of the technological and physical spaces.   This research has an analytic commitment to better understanding how mutual orientation is established, and referential practice and sense-making accomplished, within the co-present *interactional huddle* of a data session. The findings also have implications for the design of communications technologies to support geographically distributed data sessions.

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The CID video corpus: a multimodal resource for gesture studies

The CID video corpus is a project currently under development at the Laboratoire Parole et Langage (CNRS) at Aix en Provence. The ultimate aim of the project is to build a platform for the semi-automatic annotation of video corpora and share the video files as well as their corresponding annotations with the rest of the scientific community. At present, the database is composed of a video corpus of 5 hours of spoken French (dialogic conversations - 10 speakers). The audio files have been transcribed in an enriched orthographic transcription and annotated automatically at the prosodic level in Praat using the INTSINT/MOMEL algorithms developed at Aix. It has then been automatically annotated at the morphosyntactic and syntactic levels with the syntactic analyzer

proposed by vanRullen (2004). We also consider the pragmatic level for specific phenomena like discourse markers, backchannel signals as well as larger discourse units like

turn taking. We are now annotating the gesture level using Anvil. For this particular annotation, we use an enriched version of the gesture description proposed by McNeill (1992) and the MUMIN coding scheme (Allwood et al., 2005), adding to the transcription the annotation of trunk positions. We also revised the already quite complete Mumin coding scheme so that levels of annotation are not redundant: whereas in Mumin, the gestures are transcribed according to the speaker,s role in the interaction, in our scheme, this role is transcribed independently from the gesture annotation. It will still be eventually possible to retrieve the information on interaction with an XQuery program developed conjointly at Toulon and Paris at the LIMSI and LSIS laboratories which will allow complex queries through multiple XML files. In the end, the project will not be limited to the transcription of French, tools being customized for other languages as well such as English.

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Session 5D: MULTIMODAL INTERACTION (Band Room)

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Exchanging Glances While Talking And Driving

The paper focuses on the distribution of glances during conversations held in cars between one or more passengers and a driver. This situation is characterized by a multi-activity (i.e. by multiple simultaneous activities going on, as talking, driving...), by a multiplicity of foci of attention, and by possible convergent or divergent orientations of the participants.

In this spatial context, where co-participants are disposed side-by-side, the economy of glances and gestures as multimodal resources for the organization of social interaction is peculiar, especially when compared to ordinary face-to-face conversation (as analyzed by Kendon, 1990 or Goodwin, 1981). However, it remains sensitive to the sequential organization of talk : the orientation toward details relevant for the activity of driving are either orderly embedded within the sequential organization of conversation or exploited as resources for dealing with sequential features such as dispreferred answers or the management of disaffiliation.

The analysis is based on a corpus of videorecordings of various naturally occurring car journeys. The integration of the multimodal details within the organization of turns-at-talk opens for questions about the reflexive relation between material and spatial environment on the one side and turn organization on the other side; about the sequential order of multiple concurrent activities; and about the participation frameworks shaping and shaped by multi-activity.

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The Exhibition Of Gesture In Dance:
Teaching Dance Steps: Verbal Instruction And Gestural "Demonstration"

The aim of the paper is to study the ways in which expert dancers present and *teach-to-perform* dance academic steps to absolute beginners. During this pedagogic process, movements are both told, narrated, and shown, exhibited.

Dancing consists in a conglomeration of gestures which are not isolable from a longer sequence of movements. Instead, teaching steps means that the step should be exhibited and shown by the teacher in a way that separate it from the sourrounding movements and that it could be most recognizable by the parties. This stereotyped configuration is precisely (and socially) identifiable and nameable. Two different sign systems are at stake [Goodwin, 2003; Kendon, 2004]: teachers make use of both verbal instructions (movements' properties

description and prescription) and gestural "demonstration" (movements' properties exemplification) [Goodman, 1968].

This paper comes from my ongoing study on the professional world of dancers. In particular the paper is based on about 40 hours of videorecordings of dance classes in an Italian dance school.

The paper focuses on the ways dance teachers present new configurations of movements to students in a dance class. It will show the ways in which the teacher frames the step's presentation with verbal communication, describing gestures conglomeration, thus embedding ways of looking to the gestures themselves. Regarding the gestures and the movements of the teacher, the paper identifies and describes five dimensions of the gestural exemplar representation of academic steps:

- *isolation*: of a step from sourrounding movements;
- *emphasis*: or movements' accentuation;
- *slowdown*: or movements' speed reduction;
- *repetition*: of the whole step and of its movements;
- *segmentation*: of a movement from other ones belonging to the same step.

Some final considerations on the difference between the configuration of steps during dancing, performing steps and teaching will be discussed.

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Proxemics And Gestures: Non-Verbal Modalities In University Lectures

Based on a previous qualitative analysis carried out on space management in four university lectures (held in English, German and Italian in a European university), the presentation explores instructors' proxemic behaviour and its relation to gestures. In particular, the study takes its departure point from preliminary findings showing that proxemics can be related to speech in that lecturers' movement from one point to the other in the "classroom space", as well as location in different points, visibly display the start or conclusion of communicative units, both within monologic and dialogic phases (i.e. announcing topics, drawing conclusions, launching a discussion, giving the floor to intervening students, etc.). Against this background, the investigation is taken to a further step by looking at the connections between proxemics and gestual behaviour, seen as contextualization cues - on a content and/or on an interactional level - within the communicative event. Issues like the degree of synchronicity and co-occurance, as well as (relative) autonomy and specialization of functions of proxemics and gestures are thereby approached; furthermore, the comparison between the kind of "exploitment" of both non-verbal modalities shown by the four considered lecturers is linked to the issue of individual communicative styles in academic teaching, so as to see how and to what extent non-verbal behaviour indexes and supports the monologic or dialogic orientation given by lecturers ("institutional" experts in the context of asymmetric communication) to the relation established with students.

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2:30-4:00 Poster Session 1 (Concert Hall Lobby)

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The Impertinence of Gesture in the Imprint of The Daguerrotype in Proust's *Le Temps Retrouvé*

The presentation examines the poetic status of gestic details in the *Le Temps Retrouvé* through the theories of early photography in the mid-19th century. I explore how the problematic status of gestures in the novel comes to challenge Proust's early theories of representation. Whereas a generation of critics following the theoretical path opened by Deleuze in *Proust et les Signes* posit that the meaning of the *Recherche* lies in the activity of decoding the function of linguistic signs, I demonstrate on the contrary how visual signs in the *Recherche* undermine a theory of the novel based on a poetics of language. In analyzing Proust's fascination with Daguerreotype techniques, I analyze the transformation of the writing process into a photographic process and discuss how the photographic capture of subversive gestures in the novel brings forth a new theory of Time based on a dynamic representation of the signifying body.

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From Speaker To Speaker: Repeated Gestures Across Dyads

Speakers in dialogue have been shown to converge over time on the use of specific verbal expressions. This repeated use of expressions has been called lexical entrainment. A comparable phenomenon can be found in gesture. For example, interlocutors show a higher rate of similar gestures when they can see each other (Kimbara, 2006). Also, watching mimicked speech and gesture leads to higher production of mimicked speech and gesture (Parrill & Kimbara, 2006). We investigated whether gestural representations persist over time and are passed on from speaker to speaker. Participants watched one of five video clips in which a speaker describes a series of narrative events. Clips varied whether speakers used gestures and if so, what gesture form they used. Subsequently, participants had to relate those same events to an addressee. We analyzed whether participants produced gestures similar to the gestures the previous speaker had produced for narrating the same event. The results show that participants were more likely to produce a certain gesture form when they had seen the event described with that same gesture form, indicating gestural convergence. Implications for theories of gesture production and mechanisms of mimicry and entrainment are discussed.

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Dance & Writing: Integrating Movement in the Process of Revision

Gestures and bodily movements contain significant amounts of semantic information that helps inform an addressee. Beyond communication with another, however, can one gain information through investigating one's own articulated movement and gestures? My research looks at the role of bodily motion in the process of revising written work to expand descriptive word usage and language fluency. Can information embodied in our own gestures and movement support knowledge generation and knowledge transformation? In a 4th grade writing classroom I engaged learners in dance-based movement practices that included dance composition and movement analysis. This experience was then integrated into their writing. One student's writing before engaging in movement exploration begins, "When they tried to beat him up, I was mad." At this point, students worked in small and large groups to explore the bodily attributes of an emotion. They were asked to create short movement compositions that communicated a felt emotion, in this case, anger. They then examined each other and themselves as they spoke and danced how they felt. They were directed to notice and discuss not only body

movement but simple gestures as well. Language generated from these activities was used to support the students' writing. A revision of the student's sentence above reads, "When they tried to beat my brother up, I was mad. My breath was huffing like a whirling tornado. My fists were balled up tightly. I felt my nails digging into my skin. I was trying to keep the chains inside my body from busting open. Mama was always telling me to stay cool, stay cool." The student's writing clearly becomes more vivid and more expressive. The central idea also develops as it moves past anger and into a more complex reflection of self-constraint and maternal expectations. My research investigates how movement, gestures, and the body work together to act as external maps to hold onto ideas. Furthermore, my research examines how the body can be a source for expanding knowledge, and explores the cognitive and collaborative activity of translating visceral, embodied knowledge into language.

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Sociocultural Theory, Mimesis, and Second Language Acquisition

Donald (2001) argued that mimesis is fundamental to communication and culture. Mime forms the basic level of mimetic action, as found, for example, in the imaginative, expressive play of children, who, during play, typically imitate aspects of the world around them, including the actions of their parents, pretending to be those they will become (Vygotsky 1978). According to Donald, mimesis is central to tribal identity (culture), for example, the way we look at each other when we talk, our facial expressions, our embodied behaviors at weddings, funerals, religious worship, and other forms of ritual activity. Ontogenetically, mimesis starts at an early age, Donald citing Linda Acredolo, who found that a nine-month-old child puckered his/her mouth to represent a fish (p. 265). He also cites Katherine Nelson (1996) in this regard, who "has assembled an extensive body of evidence that shows how mimetic event representation is the universal means of interacting with very young children" (p. 265). Gesture, of course, is also an important element of mimesis. Moreover, there can be an implicit grammar to a sequence of gestures, which is also a property of mimesis, that is, a grammar of actions, according to Donald (2001 p. 268). This presentation will explore possible connections among sociocultural theory, mimesis, gesture, and second language acquisition, both conceptually and through examining video recorded data.

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Meeting of the Eyes: The "Ratifying" Function of Gaze in Social Interaction

As a kind of non-verbal signal for communication, gaze is recognized as unique, since it allows one to collect information from others and simultaneously send information about oneself to them. Gaze, therefore, serves a monitoring function as an act of perception, as well as an expressive-regulatory function as a signal for various aspects of affect and intention that motivate one's monitoring for information about another (Kendon 1967, Argyle & Cook 1976). However, existing literature, consisting primarily of experimental studies, has made no attempt to further delineate functions of gaze on the basis of the targets at which gaze is directed. It stands to reason, nevertheless, that gaze directed at another's eyes plays a different role in communication, since 1) such a target offers less substantive information than others (e.g. parts of another's body or surrounding objects), and 2) such an act is deliberately made to be received by the other. Indeed, the eye-to-eye look has been noted to occur in specific communicative occasions (e.g., at the opening of encounters), although little explanation is offered for the significance of its distribution. In this paper, I propose a new function of gaze that pertains specifically to eye-to-eye look: that of ratifying. Data collected consist of naturally-occurring interactions in traditional Chinese local markets where meeting of the eyes is strategically controlled. Analysis reveals that avoidance of eye contact is synchronized with deliberate withholding of explicit performative acts, and the establishing of eye contact often coincides with the occurrence of the first verbal exchange. I argue that unlike non-eye directed gaze which serves as signals of attention or direction, eye-to-eye look has no stable meaning attached to it. Rather, it serves the ritual function of ratifying the most probable situated inference of other communicative signals such as broad facial expressions, bodily maneuverings, and speech.

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Conceptual Gestures As Communicational Resources In Second Language Interaction

Although, within the last years a range of experimental research has been investigating into the role of gestural display in second language acquisition (e.g. Gullberg 1998), we still have very little knowledge about the ways in which body display features in the interactional use of a foreign language in everyday situations. In fact, research within the approach of "Interaction & Acquisition" has provided a great deal of insights into verbal procedures of dealing with language problems within the course of a conversation, but it is only very recently that a few studies have started to take up a multimodal interactional perspective (e.g. Kida 2003, Carroll 2004, Pitsch 2005, 2006). In our talk, we will adress this desideratum and investigate into the role of conceptual gestures in bilingual classroom interaction, i.e. in history classes which are held in the students' foreign language and thereby offer an institutionalized context for language immersion. We will focus on situations in which a teacher systematically uses conceptual gestures as a means of "on-line semantising" specific elements of his talk without offering any further verbal explanations. With the methods of ethnomethodological Conversation Analysis, we will address the following questions: How do the students deal with these multimodal communicational offers? What are the interactional implications of this procedure? The availability of video recordings of the whole lesson as well as copies of the students' notebooks will allow us to analyse the progressive steps of reception, stabilisation, occurring problems and potential re-definitions.   Findings will give insights into the reception of gestures in interactional contexts as well as into multimodal aspects of foreign language appropriation.

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The Pen As A Gestural And Interactional Resource

In most face-to-face interaction, and especially in workplace settings, participants find themselves surrounded by various kinds of objects and artifacts. Over the last few years, research mainly within the field of Workplace Studies has attempted to understand how people make use of these tools, and how they feature in the sequential organisation of their work practices (Heath & Luff, 2000). However, further observation shows that participants not only use these tools for fulfilling the specific action they are designed for but also as a gestural and interactional resource. Here we consider how a pen is not solely used for writing or sketching, but also how it supports a range of additional activities in institutional interaction. On the basis of videorecordings from various settings (esp. design-studios and classrooms) we will be interested in the detailed ways in which pens are handled by the participants during their interaction: What is the pen doing in the hand apart from writing? How is it gesturally used? What kind of interactional work does its handling accomplish? With these questions we will focus on the subtle interactional work accomplished when a pen is lifted from the paper, placed, held in mid-air or gradually moved and twisted, giving raise to gestures. We will also explore the interactional embeddedness of opening/closing a pen or chewing on it and the interactional significance of switching between different kinds of pens (pencil vs. differently coloured felt markers). Findings will give insights into the ways in which gestures, talk and tools are embedded with each other (cf. also Streeck & Kallmeyer, 2001) as well as organisational details of interaction (coordination of parallel activities, negotiation of participant status, dealing with the delicacy of proposals etc.).

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Building A Knowledge-Base Of Nonverbal Behavior For Use In Work Settings

Creating a knowledge-base of nonverbal behavior to enable non-specialists to recognize and interpret the actions of, and interact with, a foreign cultural group presents challenges on many levels. Since it is impossible to capture and document all possible nonverbal behavior in a repository, one must make intelligent choices of what to include based on such factors as typical and distinctive cultural features, end-user needs and priorities, work processes and contexts, as well as technology resources. This paper will report on a prototyping effort to create such a knowledge-base and the relative importance of gestures as representative data. Another important aspect of this prototype is the investigation of what aspects of nonverbal behavior tend to be most useful to people in certain types of work activity and how one might use that information in knowledge-base design. Findings based on ethnographic research with selected workers in real-world settings will be discussed. Special attention will be paid to examples of particularly successful "intuition practitioners" who have a "knack" for interpreting nonverbal behavior in ways that enable them to accomplish their work. The implications of this work for bridging from basic to applied research on nonverbal behavior, and further to real-world applications, will be assessed.

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Does Motivation To Communicate Influence Gesture Production?

Speakers' gestures are influenced by their audience. For example, speakers produce fewer gestures when their audience cannot see them, although they do not completely refrain from gesturing (Alibali, Heath, & Myers, 1999). Speakers also alter the form and detail of their gestures depending on the location of the audience (Özyürek, 2002) and on whether or not their addressee is knowledgeable about the topic (Gerwing & Bavelas, 2005). This evidence suggests that speakers consider whether gestures will be helpful in communicating information and let this information at least partially guide the gestures they produce. Although speakers seem to consider the presence and knowledge of their audience when designing gestures, it is unclear whether speakers also consider the importance of communicating successfully when they design their gestures. We tested this possibility by manipulating the expectation that speakers had about their future interaction with their interlocutor. Speakers learned a map of a fictitious town and then described routes within this town to a listener. They believed that the routes would be an important part of a game that they would soon play in which the other person would either cooperate with them, compete with them, or merely play simultaneously. We found that speakers who believed they would soon be cooperating with their interlocutor produced a higher percentage of gestures that crossed a boundary, as defined by Beattie and Shovelton (2005), (M = 24%, SD = .19) than speakers who believed they would be competing or playing simultaneously with their interlocutor (M = 15%, SD = .13), t(44) = 1.97, p = .05. We also found that cooperative speakers were significantly more likely to look at the interlocutor while producing gestures (M = 58%, SD = .34) than speakers in the other two conditions (M = 37%, SD = .29), t(44) = 2.20, p = .03. These results suggest that speakers do alter their gestures based on their motivation to communicate clearly.

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Child's Early Gesture Integrated With Topical Flow In Picture Book Environments

The presentation demonstrates the child's use of preverbal gestures as a dynamic, situated practice: how the gesture is used as the principal means by the child to express communicative intentions and to initiate sequences of action through gestures at preverbal stage. Thus, the study gives insight into the developmental phenomena at

the period of a child's established use of gestures, particularly deictics, before spoken language has appeared. Specifically, it is examined, how the child's gesturing is interpreted by the adult to be relevant next action in the course of interaction when looking at picture books. Sequences of consistent collaborative topical activity are examined including the child's gestural attempts to focus the adult's attention on the certain target referent and the adult's orientation for recognition and acknowledgement on the child's intention to elaborate on the very recent referent. The adult's orientation to create consistency between the referents that originate in the picture book is revealed through certain lexical expressions in the adult's speech. The point of departure taken for examining these questions in the present study is interactive. Thereby it is examined how the referential choices by the adult are integrated with the child's gestures in the on-going interaction. The method of this multi-case study is qualitative and data driven conversation analysis. For the current purpose, the samples of video data concerning a boy at the age of 16 months, are selected from the database that is composed of videotaped interactions (total 60 hours from 6 families) between the child (at the age of 1 to 2 years) and the parent looking at picture books in their naturalistic home settings. The selected sequences of the data are transcribed and analyzed, focusing the micro- analysis on the sequential organization of the participants' verbal and nonverbal actions (hand movements, gaze, vocalizations and adult's speech and language) especially examining the sequences in which the referent in the picture book is elaborated attaching it to another referent either in or outside the book. The presentation illustrates the general approach of the study and picks up some findings demonstrating, how the child's gesture is treated by the adult as a topical offer, thus, as a request to make a comment on the target being pointed at and how the participants create a shared referential focus through multimodal (verbal and nonverbal) referential resources in the course of interaction

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Use Of Pointing In Mother-Child Joint Story Telling Session

Analyses of mother-child joint story telling show cultural differences in the content of the talk as well as the turn taking styles (Kakinuma et al 2006).

In this study, we have focused on the use of pointing by the mother and the child in joint story telling session. Fourty Japanese, and Chinese children aged between 3 and 5 years and their mothers were presented with drawings of interpersonal conflicts. The stimuli were ambiguous, yet encouraged causal and consequential reasoning.

The results showed that Japanese children used pointing as often as the mother in the joint story telling session. In some cases, both the mother and the child pointed at the picture simultaneously. Mothers tend to use pointing to prompt the child to talk. Chinese children also did much pointing. Children tend to use pointing to indicate which part of the picture they are talking about. Unlike US mothers who tend to point briefly, Japanese and Chinese, rather than touching the picture shortly, placed the finger on the picture and draw circles on the area they are talking about.

Differences observed in the use of pointing are similar to the differences seen in verbal turn taking patterns in the same situation (Kakinuma et al 2005). While US mothers talked, children remained quiet, Japanese mothers would prompt children to join in talking, and Chinese mothers tend to let children do the talking. The function of pointing seemed to reflect the style of talking.

Pointing is used to supply further information. Both Japanese and Chinese mothers stroke the areas they try to draw attention to. They move fingers often when talking about emotional states or mental states of the children in the picture.

Pointing is often thought of as an universal feature in human, but its style is culturally defined, indicating that pointing is similar to language in its development.

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Through the Eyes of the Child: Interactional Imagery, Simulation and Gesture-SCA

This recent work re-examines gestural repertoires from an inter-modal interaction perspective. The repertoires of children with and without speech and motor impairment are considered in response to environments created in a variety of narrative contexts. Exemplars are taken from the Roy-Panayi Gestural Corpora [RPGC]. Atypical co-participants in these studies, diagnosed with developmental disorders of, severe speech and motor impairment (SSMI), do not typically employ the gestural modality for communication. Conventional, this is considered to be due to the lack of motor control and/or the nature of the congenital brain lesions or acquired conditions. In the case of children with athetoid cerebral palsy, lesion are typical of the basal ganglia, c.f. spastic cerebral palsy where the affected region involves the cerebellum, both sites considered to be involved motor control. An action based annotation system is described that uses feature sets which represent aspects of child spatial and kinaesthetic cognition.   The preliminary descriptive model for Spatial Cognition as Action (SCA) Panayi & Roy 2004/5 was developed from an ecological modelling approach based on previous work inspired by the Gibsons '79, '00 and the concepts of Physicality & Tangibility of Interaction, Roy & Panayi '99/2000. This earlier work considers expressive interaction to arise from the interaction of people and their environment, in part a systems approach, that suggest that gesture-in-interaction is part of an emergent dynamic non-linear system. Neural network modelling techniques were applied successfully to the recognition of dynamic gesture of people with severe speech and motor impairment, [Roy, 1992/3/4/6]. The SCA model is informed by narrative and motor control theory and recent neuro-scientific imaging advances that suggest further evidence for the neural, actional and semantic basis of communicative interaction in terms of spatial representation. Two propositions underpin the SCA model. Firstly that, Intentional action as gestures, are predominately driven by the nature of our understanding of the action in the world and, secondly that, knowledge of the world can be represented and explored in terms of body schema in relation to the self, the other and interaction with artefacts, [Panayi 1992/3]. The value of a developmental approach to the study of gesture is discussed. Consideration is given to the role of conceptual integration with respect to motor resonance [Gallese et al 2006] and motor control in atypical communicators. The later aspects, until very recently has received reduced emphasis, particularly in recent neuroscience research where complexity and context are inaccessible to current experimental methodologies. The implication for human-machine interaction and the potential for pedagogy/therapeutic applications are discussed. Key words: model, neural networks, gesture, children, spatial cognition, action, inter-modal, interaction, speech, motor control, resonance, body schema, artefacts, narrative, neuroscience, neural, language, theory, conceptual integration.

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How Much Gesture Do You Need:
Exploring Temporal Aspects Of Iconic Gesture Comprehension

A steadily increasing number of studies have shown that iconic gestures have an effect in speech comprehension. While such experiments indicate that a listener can extract additional meaning from iconic gestures, it is still unclear how much of a gesture is needed before it becomes meaningful. A gesture can usually be divided into three consecutive time phases: preparation, stroke and retraction. Most researches consider the stroke as the essential part of a gesture phrase, because it has been theorized as the segment in which the meaning is expressed. In this experiment, we explored how much of an iconic gesture is needed to successfully disambiguate a

homonym. A gating paradigm was used to determine the earliest point at which gesture information reliably contributed to the selection of one of the two meanings of a homonym. For 60 out of 96 gestures, the information in the preparation phase already sufficed for a successful disambiguation. We extended this finding using an ERP experiment. Participants were presented with short video clips of an actress uttering sentences ('She was impressed by the BALL, because the TOY/DANCE ...'). The ambiguous noun was accompanied by a dynamic gesture that was presented up to its disambiguation point. Then the visual stream stopped whereas the acoustic stream continued. ERPs elicited by the target words (i.e. TOY/DANCE) showed N400 effects, which indicated that the shortened gestures had disambiguating properties. Thus, listeners seem to be able to extract a substantial amount of information already during the preparation phase of a gesture.

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Integrating an Image of the Speakers in Online Synchronous Interaction

While the majority of studies of body movement have been conducted in face to face (or "presential") situations, we are seeing nowadays the development of "distance" and multimodal synchronous interactions: here, the interactants exchange speech, but they also have direct access to an image of their interlocutor (by webcam, by visio-phone, etcÖ). These new technologies can be used for pedagogical purposes. Our area of study involves interaction between a tutor and a learner of French, through an instant messaging tool. In this communication system the speakers avail of audio and video channels: while speaking they see not only the face of their interlocutor, but their own face too. These online interactions have been filmed, and it is on the phenomenon of regulation produced by this double image (of oneself and of the other) that we have focused our studies of the gestures, the gazes and the gesticulations of the two participants. In addition to the analysis of this multimodal corpus, our comprehensive approach will be supported also by interviews with the interactants, in an attempt to clarify their own representations regarding the questions of the regulation of interaction mediated by this format of online communication tool, and also regarding, in particular, the consequences of self-perception involved in seeing one's own face while interacting with someone else.

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From Action To Communication: Chimpanzees' Food Requests Reflect Food Actions

The transition from real world actions to representational gestures may have played an important role in the evolution of language (e.g., Corballis, 2002). If true, then our phylogenic ancestors may show evidence of reproducing actions in the interest of communication. Captive chimpanzees produce manual gestures that have been shown to be both communicative and referential (Hostetter, et al., 2001; Leavens & Hopkins, 1998). These gestures may emerge from early attempts to reach food that is outside the captive chimpanzees' cages and is thus unreachable (Leavens, et al. 2004). For example, there is a correlation between hand preference for reaching at

age 3 and hand preference for gesturing later in life (Hopkins et al., 2005), but no correlation between hand preference for a coordinated feeding task at age 3 and hand preference for gesturing later in life. This suggests that the form of chimpanzees' gestures is specifically associated with the form of their early reaching actions. The present study further tested the claim that chimpanzees' gestures are associated with real world actions. We compared the gestures chimpanzees use to request two different items, each with its own unique set of motor affordances. A juice bottle is strongly associated with oral actions as caregivers typically squirt juice directly into the chimpanzees' mouths. A piece of fruit is strongly associated with manual actions as caregivers typically place fruit in the chimpanzees' hands. We predicted that the chimpanzees would produce significantly more manual gestures (food begs and points) when offered a banana and significantly more lip pouts when offered a juice bottle. The data support this prediction and suggest that chimpanzee communication is based on instrumental action.

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The Augmentative Role Of Gestures In Maternal Communications

What is the role of gestures in mothers, communications? Research verifies the frequent use of gestures in mothers, communications to their young children. Surprisingly, we know little about the role of gestures in maternal communications. Are gestures augmenting the content of speech or are they complimentary to speech aiming to covey novel information? The purpose of this study was to examine the role of gestures as mothers communicated with their toddlers about known and unknown shapes.

We tested 27 mothers and their 18-month-olds during a shapes game. Based on maternal reports, we chose 3 known and 3 unknown shapes. Dyads sat at opposite sides of a table and were separated by a divider that obstructed view of each other,s side of the table. Mothers, task was to get their children to hand them a target shape. Children,s task was to find the target shape among 3 shapes. We examined the functional aspects of mothers, speech that occurred during each of their gestures.

Overall mothers, used gestures to augment their speech. Specifically, gestures accompanied mothers, attention getting, referential and regulatory speech. Pointing, clapping and snapping of fingers primarily accompanied attention getting speech (i.e., "Look, *child's name*"); drawing of the shapes in the air or forming the shapes in the air using their fingers were used primarily to accompany utterances that either named novel shapes or described the physical aspects of these shapes (i.e., "the pentagon," "the one with the pointy top"); "give me" gestures accompanied directives of children's actions (i.e., "give it to mommy"). Gestures visually represented the content of mothers, messages. Gestures clarified the intent of maternal utterances and provided physical depictions of novel information conveyed in speech. In maternal communications, gestures serve as a scaffolding strategy accommodating young children's limited abilities to decode intent and information conveyed by language.

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Mirroring Gestures: A Window on Second Language Learning

Gestures are ubiquitous in human communication. Yet few studies have examined their effects on second language learning and pedagogy. This paper reports on the situated significance of mirroring gestures in a Japanese as a Second Language (JSL) classroom. Microethnographic video analysis was conducted of a JSL classroom at a university in Japan. The analysis showed how: (1) the teacher's gestures focused attention selectively on new language items, and facilitated their incorporation into learner speech and gesture production;

and (2) learners' gestures functioned both to indicate understanding and request assistance. More specifically, both teacher and students were found to imitate their interlocutor's gestures as if facing a mirror. Such gestures occurred at different stages of receiving instruction and learning: (1) when the teacher presented information; (2) when students integrated the new information with older knowledge; and (3) when students actively expressed the new knowledge. This process appears to correspond to descriptions of learners' hypothesis testing--the testing of ideas about language to see if they are correct. The following suggestions are derived from the analysis. First, learners' gestures may indicate the operation of learning processes. That is, gestures may indicate how learners integrate new information and old knowledge, according to their interlanguage stage. Second, learners appear to develop their linguistic knowledge through active speaking and gestural co-construction with more advanced interlocutors. Third, active teacher-student interaction in the gestural modality has a positive affective influence on the language classroom. Such interaction therefore creates a more relaxing, lively, and engaging learning atmosphere. By focusing on gesture, these findings broaden our understanding of pedagogical and acquisitional resources in the second language classroom.

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Contrastive Approach Of Multimodal Communication In French And Spanish

Our study deals with the multimodal communication in French and Spanish. It is a contrastive approach, so we analyse the gestures of speakers with a common language, either French or Spanish, but a different culture. For the French language, we compare Metropolitan France speakers and Quebec speakers. As for Spanish, we compare the gestures of speakers from Spain and from Argentina. In order to constitute the corpus, we have recorded television programs. Our study is principally aimed to analyse the gesture-space used and its organization in relation to prosody. To do so, we will base our research essentially on McNeill's works following his gestural typology. Several previous works have also been taken into account since we will refer to Müller, Poyatos and Payrato studies on the analysis of the relationship between gesture and voice amongst spanish speakers. Concerning the prosodic part, we have taken into account Di Cristo's and Guaôtella's works on the variation of intonation. Refering to McNeill's work (1992) and to the figure "Division of the gesture space for transcription purposes," from Pedelty (1987), we can refine our study by underlining the gestural movement on the vertical and horizontal axis and comparing these analyses of gesture-space used to the variations of the fundamental frequency and intensity. If the complementary aspect of gesture-voice is necessary for the communication process, it is also necessary for the meaning. Therefore, the simultaneous observation of speech, gesture and voice, studied in a comparative analysis of a double context (Metropolitan France/Quebec or Spain/Argentina) allows us to draw up hypothesis on communicative paraverbal and nonverbal strategies which are used by different speakers. Thus, we will try to determine, first in each French or Spanish-speaking area chosen and next between both languages, in which way these strategies differ or on the contrary converge and eventually to bring out the cross-cultural aspects.

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Mothers' Use of Gestures When Communicating About Motor Actions

As infants become independently mobile, mothers must recognize when to encourage and when to discourage infants'actions to provide challenges while preventing mishaps. Often, mothers preemptively offer their infants advice about ways to act, and about the danger or safety of situations. Mothers might communicate via language and/or gestures when instructing their infants. However, no study has examined the content of mothers' gestural and verbal messages in potentially risky motor tasks. How do mothers combine gestures and language to effectively communicate with their infants? We examined whether mothers couple gestures with language; if gestures offer new or redundant information vis-a-vis mothers' language; and whether mothers vary their gestures and language across infants' age. We addressed these questions as 52 mothers encouraged and discouraged their 12- or 18-month-olds to descend safe and risky slopes. Mothers offered verbal information without gestures on half the trials (49%), but always accompanied gestures with verbal information (99.6% of trials). Gestures provided redundant information (60% of trials) and new information (28% of trials). Mothers were more likely to accompany gestures with language for younger (58% of trials) than older infants (42% of trials) and more likely to provide their younger infants with redundant gestures that indicated where to go (71% of trials versus 50% for older infants). In contrast, mothers of 18-month-olds were more likely than mothers of 12-month-olds to gesture in ways that provided new, supplementary information to their vocalizations (e.g., telling infants to "Sit down"while gesturing "Stop"). Findings indicate that gestures play a central role in mothers' communications to infants about safety and danger in potentially risky locomotor tasks. Mothers' gestures both replicate and augment verbal information. Mothers are more likely to match language and gestures when communicating with younger versus older infants.

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Exploring The Interpersonal And Intrapersonal Role Of Gesture In Communication

Speech and gesture are inextricably linked, forming an integrated communication system. Our research has explored which aspects of communication are tied to the hands. The role of gesture in communication in adults (n = 68) was explored by controlling the type of communication participants engaged in and manipulating the visibility of a communicative partner. This study identifed the gestures that a) function for the speaker and b) are for the benefit of the recipient, by identifying elements of speech that elicit gesture even when a communicative partner was not visible. These gestures mapped on to the semantic aspects of their lexical affiliates, but the effect was greatest when the items being communicated were "praxic" or manipulable. As well as distinguishing the inter- from the intrapersonal functions of gesture, our work has explored how we can translate this into helping children who struggle to comprehend communication. Some children with a specific language impairment (SLI) have difficulty integrating the meaning of language with the context in speech. We investigated whether gesture can offer these children a non-verbal context to assist their pragmatic comprehension. Language impaired

children (N = 21) and age matched typically developing children (N = 26) were presented with speech that requires the meaning to be integrated with context, with and without gesture. Presenting speech with complementary gestures markedly improved childrens' comprehension, especially those with a language impairment, allowing them to communicate more effectively. Together, these studies highlight how gesture facilitates communication, for both the listener and the speaker. Adult speakers gesture more when speaking of items with particular semantic properties, even in the absence of a visible communicative partner. For children who have difficulties processing speech, gesture may be the route via which they integrate the meaning of language with context.

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The Relation Between Maternal Points And Infant Vocabulary Growth

Pointing while naming accounts for as much as 90% of maternal infant directed communicative behaviour (O'Neill, Bard, Linnell & Fluck, 2005). We set out to examine the relation between maternal pointing and the emergence of infant pointing, with three goals in mind. First, to investigate the notion that maternal pointing is contingent on the infants' ability to produce and comprehend pointing. Second, to investigate changes in maternal and infant pointing during a relatively abstract task versus a relatively concrete task. Finally, to establish the value of maternal pointing as a means of scaffolding word learning. With this in mind, we calculated the frequency and duration of points produced by 12 mothers during interaction with their infants in the month prior to the infants first reported point, the month of the infants first reported point, and the month of the infants first observed communicative point. Dyads were observed while engaged in three tasks designed to differentially elicit pointing, a picture description, free interaction and a word description task. Mothers also completed a communicative checklist prior to each visit. We found effects of both context and infants communicative status on frequency and duration of maternal pointing. Maternal point rate and duration were highest during the picture task. During the month prior to the infants' reported production of pointing mothers tended to produce few points, but those points were held for longer than in subsequent sessions. The highest rate of maternal pointing was observed during the month of the infants' first observed point. Infants' lexical knowledge of each stimuli item also influenced maternal point rate, but not duration. Correlations between maternal pointing and infant word learning suggest that pointing may scaffold emergent language ability.

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The Origin Of Gestures In Infancy

Gestures are deliberate, communicative movements of the hands. Empty-handed gestures, particularly pointing, have been observed in children from as early as 9 months of age (e.g., Masur, 1983). Clark (1978) argued that childrens' earliest gestures emerge from having participated in actions; e.g., the give gesture could come from a child's reaching toward an object and a parent's interpreting the reach as communicative attempt. More recently, researchers have posited other possible origins of gestures, particularly pointing, including earlier index finger extension (Matsumi, 2002), joint focus of attention (Butterworth, 1991), and culture-specific symbols (Wilkins, 2002). In this study, we tested Clark's hypothesis that early gestures emerge from participating in actions. We examined four infants' use of gestures monthly between 7 and 11 months of age. Every month their families videotaped them in free play conditions. Two of the infants heard Mandarin Chinese and English and two of them heard French and English, allowing a check for cross-cultural generalizability. We examined the childrens' use of participant gestures (i.e., pick-me-up and give) and social gestures (i.e., hi) over time. As the children got older,

their use of participant gestures decreased and their use of social gestures increased. Furthermore, there was a marked increase in the number of gestures produced a month after the onset of social gestures. The form of childrens' indicating gestures changed with age: i.e., as the children got older, they indicated less often with their full hand and more often with their index finger. These results indicate that Clark may have recognized one important variable in the origin of childrens' early gestures: participating in actions. However, the results also suggest that participating in action may not be sufficient to result in gestures: increasing social engagement with age also plays an important role in childrens' use of gestures.

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A Comparative Study of Gesture Patterns Inside and Outside the Foreign Language Classroom
Based on numerous theoretical frameworks, research dealing with both gesture studies and second language acquisition attempt to better understand the process of communication. Communication in and of itself can occur in two different ways: verbally and nonverbally. Current gesture studies research concerns itself with describing nonverbal communication while current second language research concerns itself with describing the verbal aspect of communication. However, there seems to be a lack of interest in uniting both fields in order to better understand the role of nonverbal communication in the second language environment. The goal of this study is to observe the nonverbal communication patterns of one native speaker of peninsular Spanish in two different environments: inside the classroom and outside the classroom. I intend to compare the gestures found in a casual environment outside the classroom with the gestures found while teaching Spanish as a foreign language inside the classroom. The results of this project aim to shed light on the gesture patterns that are inherently at play when one individual from a particular background teaches a second language. If the main objective of a second language learner is to learn to communicate in another language verbally and nonverbally, it is imperative for researchers to fully understand the gesture patterns that are brought to such an environment. Understanding this type of phenomenon will help bridge the gap between gesture studies from a psychological perspective and gesture studies from an acquisition perspective.

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4:00-5:30 Parallel sessions

Session 6A: DATA SESSION: TRANSANA (Concert Hall)

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Data Session On Transana Use For Qualitative And Quantitative Gesture Analysis
Transana is free, open-source, dual-platform software developed and maintained by the University of Wisconsin. It supports multi-user video analysis. Transcript, audio waveform and video are synchronized to support transcription, identification of analytically interesting clips, coding and search, and qualitative and quantitative analyses.   To anchor Transana's functionality we show two short segments of video. The first (:22) is an interview (high quality audio) with a beginning algebra student using a graph to explain a linear function. We invite participants to explore collective analysis of the gesticulated strategy and consider issues of interpreting coordinated sequences of gestures and gesture rate. This segment exhibits Transana's support of gesture annotations to transcript, fine-grained time coding, Boolean search, and generation of data in support of

quantitative content analyses. The transcription includes complete speech and gestures following conventions of Duncan and McNeill.   The second segment (:57) shows a discussion between 2 students (presenter and critic) during a student-led solution presentation of a 3D reasoning problem in front of a math class. The students hold different frames on the problem. The presenter's frame prevents him from accepting the 3D solution. The critic enters the presenter's space and uses gesture and body positioning to engage the presenter in an alternative interpretation of the presenter's drawn solution. Here we invite participants to look at gesture use in larger spatial and temporal scales to understand how these students strive for intersubjectivity around the drawing and its referents to the physical and mathematical realms invoked through speech and gesture. This segment also exhibits forms of keyword display that reveal temporal patterns and cyclical behavior within the discourse, and global changes over a large corpus. The transcription follows Jefferson's notation.

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Session 6B: TOURETTE'S SYNDROME (Rehearsal Room)

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The Tourettic Gesture

Tics are brief, intermittent, unpredictable, purposeless, stereotyped movements (motor tics) or sounds (phonic or vocal tics). They are associated with an urge, and voluntary suppression results in psychic tension and anxiety. Subsequent "release" of the tics results in relief. These tics are the main symptoms of a chronic neurological disorder known as Tourette's Syndrome, that is the most common and severe form of multiple tic disorder, with a prevalence of 10 cases per 10,000 population. Its onset is usually between ages 7 and 10 years. On average, phonic tics begin 1 to 2 years after the onset of motor tics. Its pathophysiology is not clear, but recent researches suggest a dysfunction in the dopamine system and an abnormal neurophysiology of the basal ganglia. Tics are classified as either simple or complex. Simple motor tics are focal movements involving one group of muscles belonging to the upper part of the body such as eye blinking, facial grimacing or shoulder shrug. Complex motor tics are coordinated movements such as jumping, head shaking, copropraxia and echopraxia. Simple phonic tics are meaningless noises and sounds, such as grunting, sniffing, clearing the throat, coughing or producing animal sounds. Complex phonic tics are words or phrases, palilalia echolalia or coprolalia. In this research we have investigated the gestures produced by a male subject affected by Tourette's Syndrome. The subject was videorecorded in a familiar setting with a digital camera and the data (approximately 2 hours of film) was processed with the software Adobe Premiere Pro 6.5.   During the analysis we singled out some tics which reproduce iconic gesture and which are related and inherent to the speech. So the tic becomes a real gesture, a *tourettic gesture,* gaining motoric characteristics and the meaning. According to us the *tourettic gesture* could supply new hints to the hypothesis concerning the relationship between gesture and speech.

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Self-Manipulation And The Tourette's Syndrome

Tourette's Syndrome was first described in 1885 by the French physician Georges Gilles de la Tourette. One of its main characteristics is the presence of multiple motor and phonic tics. Tics are abrupt, brief, repetitive movements of one or more muscle groups, frequently preceded by an uncomfortable sensation on the affected area. Tics can

be simple, such as eye blinks or head twitches, involving single muscle groups or complex, such as jumping or touching an object, consisting of coordinated patterns of movements. On the other side, phonic tics consist of simple sounds such as sniffing or throat clearing, or of more complex sounds such as words, phrases or even complete sentences. Diagnostic criteria include an onset before age 18, the presence of tics for more than one year, a variable frequency and anatomical distribution of tics and a gradual replacement of old symptoms with newer ones. The pathophysiology of the syndrome has yet to be determined, but recent researches suggest a dysfunction in the dopamine system and an abnormal neurophysiology of the basal ganglia. This paper looks specifically at how tics can interfere with the self-manipulative gestures, movements that can disclose our feelings. Therefore, we videorecorded three subjects (two men and a woman) affected by Tourette's Syndrome since childhood, and then we analysed the data with the software Adobe Premiere Pro. The parametric and contrastive analysis show that the self-manipulative gesture may become a new sheath when it is possible to insert the tic. The self-manipulative gesture is not simulated so as to hide or correct the tic manifestation, but it is executed together with the self-manipulation. Consequently, the release of the tic together with the production of a self-manipulative gesture strengthen the reduction of the tension and anxiety. According to our analysis the tic is an element structured inside the touretter, who can identified himself with his tic.

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Deictic Tic Or Ticcing Deixis?

Motor tics are defined as sudden, involuntary movements causing purposeless motor actions. They are usually accompanied by phonic tics, that are sudden sounds produced by the contractions of respiratory musculature. Tics can be divided into two types: simple tics and complex tics. The first type involves isolated muscles belonging to the upper part of the body, while the second type consists of contractions, of different muscle groups, organized sequentially. The same classification can be used to describe phonic tics, so that a simple phonic tic is for example an inarticulate sound, while a complex phonic tic is a composite vocalization. All kinds of tics represent defining symptoms of a chronic neurological disorder known as Tourette's Syndrome. Tics in touretters are often preceded by premonitory symptoms, such as a scratchy feeling or a state of anxiety, which may enable an individual to recognize an impending tic and eventually to suppress or to correct it. The exact pathophysiology of the syndrome has yet to be determined. Recent researches suggest a dysfunction in the dopamine system and an abnormal neurophysiology of the basal ganglia. Our interest in this syndrome is supported by the relatively recent researches which suggest a role played by the basal ganglia and other subcortical structures not only in the motor control, but also in the superior cognitive functions. This paper reports the findings of the analysis of deictic gestures and tics carried out in an italian touretter. The subject was videorecorded with a digital camera and the data (approximately 6 hours of film) was processed with the software Adobe Premiere Pro 6.5. The results show that the subject is able to disguised his tics and to correct them into deictic gestures. In fact, the tic is canalized towards the parameters of a socially accepted gesture by the subject who applies the main features of a deictic gesture, such as the involvement of the forefinger and the presence of a visual guide, to his uncontrollable movements.

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Session 6C: METAPHOR (Recital Hall)

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Verbal and Gestural Localization of Time in German

There is quite a substantial body of cross-linguistic research on the metaphor TIME AS SPACE. Notably this research is primarily based on verbal data (cf. Radden 2004) and so far only a few studies focused on verbal *and* gestural data (cf. Calbris 1990). All these studies have quite clearly shown, that there is a widely distributed pattern of conceptualizing the future in front of (FUTURE IS IN FRONT OF EGO) and the past behind the speaker (PAST IS IN BACK OF EGO) (Núñez & Sweetser 2006).

This qualitative study to be presented is based on two 90 minutes acadamic courses on the topic of ‚time' and nine 20 minutes dyadic naturally occuring conversation. It focused on a linguistic analysis how meaning was constructed across speech and gesture in discourse. It was found that German speakers localize time on two axes: the sagittal axis (front-back) and the horizontal axis (left-right). Verbally time is only located on the sagittal axis as future is in front and past is in the back. Gesturally, in contrast, speakers use both axes. Time is located on the sagittal *and* on the horizontal axis which means that the future is conceptualized as being in front or to the right and past is conceptualized as being in the back or to the left. Speakers point and act on both axes in the different directions. In addition, the present (the "now") is gesturally located right where the speaker stands and where the two axes cross.

This research suggests that we need to introduce three subcatagories of metaphors based on gestural conceptualizations of TIME AS SPACE: FUTURE IS TO THE RIGHT and PAST IS TO THE LEFT and NOW IS HERE. To conclude: we face here another case of metaphor expressed in gesture only (Cienki & Müller (fc)).

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Metaphoric Gesture in North Indian Classical Music

The hand gestures of Hindustani classical vocalists range from occasional, subtle waves of the hand to dramatic movements of the whole upper body. Every Hindustani vocalist moves his/her hands to some degree or another while improvising melodies.

There are many close parallels between gestures that singers make while improvising melodies and the gestures that people make while improvising speech. Unlike speech, the melodic improvisations that I'm describing have little or no verbal content; the words consist of either vocables or short textual fragments. Like speech, however, melodic improvisation is closely co-timed with gesture, so that sound and gesture are meaningfully linked together.

Using David McNeill's method as a starting point, I am undertaking analyses and transcriptions of the gestures of Hindustani vocalists, treating gesture as part of music rather than as an extra-musical accessory. In particular, I am interested in strategies of mapping melody onto three-dimensional space via metaphoric gesture. I see gestural representation not only as communication for the benefit of others, but also as embodied cognition: a way of thinking music in space. Gesture offers a view of melody as motion in three dimensions that complements the conventional view of melody as a sequence of discrete notes produced by a singer. I will give an overview of the advantages gained from this approach, outline the problems of applying language-centered methods to music, and present a musical-gestural analysis of several performance segments. I will connect these analyses to my current project, which is tracing gestural inheritances through musical teaching lineages. No knowledge of music theory or practice will be required of the audience, though I may ask you to hum.

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Metonymy In Gesture And Cubism: On Abstraction, Essence, And Relativity

Inspired by Peirce's (1955) concepts of similarity and contiguity, Roman Jakobson (1956) viewed metaphor and metonymy as two major modes of association, interacting, in most processes of signification. Drawing on diverse languages, aphasic disorders, and the visual arts, he argued that certain poets and art schools exhibit a tendency for either the metonymic or metaphoric style. Cubism, for instance, appears to be inherently metonymic in nature ("the object is transformed in a set of synecdoches," Jakobson 1956:130), whereas Surrealism has a tendency for metaphorical symbolism. Focusing on metonymy, this paper presents a comparative study of gesture and Cubism (Mittelberg 2006). It proposes a set of distinct metonymic modes that may motivate not only the synecdochic characteristics of gestural signs (Bouvet 2001; Müller 1998), but also contiguity relations holding between individual gestural signs or between the gesturers, hands and the objects they seem to manipulate (cf. Langacker 1993, Panther & Thornburg 2004).

In particular, gesture and Cubism are compared regarding their signs, schematicity, polysemy, and relativity. One of the Cubists' aims was to "discover less unstable elements in the objects to be represented, i.e. the constant and essential elements" (Zeki 1999:50). Demonstrating the pars pro toto principle par excellence (cf. Lodge 1977:93), objects and human figures tend to be represented by simple geometric forms such as cubes, squares, circles, cylinders, and triangles. These forms can, depending on their position in the semiotic structure, refer to multiple entities. Based on gestural representations of grammar, I will show that gestures depicting abstract entities and actions may be similarly elliptic and geometric. As is the case with Cubist signs, the gestures, schematic character affords their relativity: a curved, horizontal line traced in the air can signify the contours of a violin, a mountain range, or, as in the present data, an intonation contour. The potential meanings of both types of visual signs tend to require both the verbal and non-verbal context (i.e., contiguity) to be disambiguated.

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Session 6D: NAVIGATING (Fiske Hall Room B1)

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Verbal And Gestural Demonstration: A Correlation Of The Use Of Demonstratives

A correlation of the use of demonstratives and pointing gestures such that demonstratives and deictic adverbials in situational deictic use are accompanied by pointing gestures is commonly held in descriptions of demonstratives (e.g. Himmelmann 1997, Levinson 1983, Fillmore 1983, Miller 1983, Clark 2003).

(1) *Der da, Herr Kommisar, der ist es!* 'That one over there, inspector, that's him!'

It is assumed that utterances like (1) are supported by a pointing gesture towards the referent of the demonstrative. Yet, there is no precise description of the nature of the assumed correlation between gesture and demonstrative, and the existence of the correlation itself is not attested by speech data from empirical research.

This paper is based on data from a video recording of a documentary on home improvement and gardening titled *Ab ins Beet*, which was broadcast on German television in 2005. The instances of verbal demonstration in situational deictic use were identified by criteria established in the framework of the *Zeigfeld* (deictic field) by Bühler (1934), and of demonstrative reference as laid out in Himmelmann (1997). The theory of gesture formulated in the work of Kendon (2000; 2004) and Mc Neill (1992; 2000) provides the typology of gestures that allows the classification of those gestures which were found to accompany these demonstratives as pointing gestures. Moreover, it also accounts for the cognitive interaction and the temporal alignment of verbal and non-verbal elements in the speech production process.

While the identification of situational deictic use turned out to pose considerable predicament in practice, it can be shown that in all those cases that could be unmistakably identified as situational deictic usage, a pointing gesture was employed. This apparent obligation not only emphasizes the integration of speech and gesture but also raises new questions concerning the function of demonstratives.

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The Hands Show The Way: Gesture And The Development Of Spatial Communication

Gestures play an important role in the communication of spatial information because they provide information that can be difficult to communicate in words. For example, we may be able to use gesture to communicate the relative position of several locations, but such information must be communicated serially in words. Our work investigates the development of children's use of gesture and speech to communicate spatial information.

We investigated the role of gesture in speech in the development of communication of spatial layout. We asked children (ages 7 to 10) and adults to learn the locations of six toy animals in an otherwise empty room. The participants then were asked to communicate the locations to an interlocutor (either their parent or an experimenter). In contrast to most prior studies of spatial communication, we coded both participants' speech and gestures.

The results reveal important developmental changes in the use of gesture and speech to communicate the layout of the locations. Almost all adults provided information about the layout both in speech and in gesture. For example, they said that the locations formed a "2 by 3 grid", and also used their hands to show the relative locations of the animals within the grid. Young children at first provided little spatial information, focusing instead only on the sequential positions of the animals along a route. They also gestured very little.

In a second experiment, we encouraged the younger children to gesture as they gave their descriptions. This simple manipulation led to a substantial change in the spatial quality of the descriptions. Not only did children gesture more, but they also now talked more about the spatial locations of the animals. That is, they gave less sequential information and more relational information. Thus our results suggest that gesture may play a unique role in the development of spatial communication by focusing children's attention on spatial layout.

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Perspective Choice And Frames Of Reference In The Storytelling
Of A Japanese Traditional Festival, Nishiure Dengaku

The traditional agricultural festival "Nishiure Dengaku" (lit. the "agricultural festival of Nishiure") is based on the worship of Kannon and takes place in the Nishiure area of Misakubo-cho, Shizuoka Prefecture, Japan. The spatial arrangements of the 33 performances that comprise the main festival are deeply related to the ritual meaning of the event.

In this study, I refer to two conversations between the betto (the master of the festival) and researchers, in which he discussed the sequence of the performances, to illustrate how gesture and speech are used to express the space of the festival.

In Conversation 1, the betto made errors in speech when he tried to describe the lighting system used for the dancing space. His utterances after these errors seemed to be a typical repair sequence designed to utter the word "torch." However, detailed analysis of the video recording of this conversation revealed that the sequence included gesture phrases expressing an unspoken ritual, the Ohhunawatashi (Boat Crossing), in which the holy fire crosses from the temple to a large torch. Moreover, while the absolute reference frame was maintained in the gesture phrases, the perspective choice (Emmorey 2002) of the phrases changed dramatically; that is, the betto changed the scale of his phrases from small-size at mid-chest level (diagrammatic space) to large-size at eye level (viewer space) to express the Ohhunawatashi.

Nineteen days later, I asked the betto to rotate the arrangement of our interview seats by 90 degrees (to change the atmosphere) and to talk about the performances again. In Conversation 2, the betto described the Ohhunawatashi briefly in his speech. While the absolute reference frame of gesture phrases stayed the same after the seat rotation, the perspective choice changed when he described the movement of the torch crossing.

I concluded that the process of describing the torch in Conversation 1 was not merely a linguistic repair sequence but a process of coordinating gesture and speech that included reference to environmental factors to recall the dynamic movement of the performance.

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5:30 - ?   **ISGS General Meeting** (Concert Hall)

9:00-10:30 Parallel sessions

Session 7A: WORKSHOP: TOOLS INTEROPERABILITY (Concert Hall)

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Annotation Interchange Among Multimodal Annotation Tools

Many tools have been developed to annotate digital video for nonverbal behavior research. An ISGS 2005 workshop began a productive community discussion of such tools. A different ISGS 2007 workshop ("Choosing among tools for annotation and analysis of multimodal language," which is a companion workshop to one described here) will continue this evaluation. The present workshop described here, "Annotation interchange among multimodal annotation tools," has a different focus. The above-mentioned tools represent a major advance for the community. However, each tends to work well only on the data, platform, and research interests for which it was developed, and saves its annotations in a proprietary format. There is typically no easy way to share annotations between different annotation tools, or between tools for annotation and tools for analysis. This isolates researchers from one another, and hinders progress.

Our workshop goal is to promote collaboration and tool interoperability, by doing the following: In preparation for the workshop:

-          In collaboration with tool developers and other parties interested in annotation interchange (e.g. SIDGrid, LDC, NIST), we have drafted a common annotation interchange format.

-          A number of tool developers have modified their tools to export/import annotations to/from the common format. These include ANVIL, C-BAS, ELAN, EXMARaLDA, MacVisSTA, Theme, and Transformer.

-          Each tool was used to annotate a common data clip, and the annotations were imported into different tools via the common interchange format.

At the workshop:

-          Each tool developer will report on the results of the exercise.

-          The utility of the merged annotations will be evaluated by the audience.

-          Participants will discuss any revisions to the draft format.

After the workshop: The workshop organizers will coordinate publication of a final report and proposed annotation interchange format. For further information, please visit www.multimodal-annotation.org.

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Session 7B: LANGUAGE AND COGNITIVE DEVELOPMENT (Rehearsal Room)

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The Role Of Gesture-Speech Crossmodal Combinations In Early Language Development:
New Longitudinal Evidence

Several studies on childrens' spontaneous early language production have highlighted the important role that gesture-speech, crossmodal combinations play during the crucial transition from one- to two-word speech (e.g.

Capirci et al., 1996; 2005; Goldin-Meadow e Butcher, 2003; Iverson & Goldin-Meadow, 2005; McEachern e Haynes, 2004; Pizzuto e al, 2005, Pizzuto e Capobianco, 2005). However, the results of these studies are not always comparable or generalizable due not only to theoretical-methodological differences, but also to the size of the longitudinal data available, often insufficent for assessing the statistical significance of the developmental trends observed. This study provides new longitudinal evidence on a fairly large sample of ten, typically developing Italian children observed monthly from 12 to 23-25 months of age. We focus on two distinct types of crossmodal utterances identified in previous research on the grounds of the different information they convey: "complementary" and "supplementary" utterances (Goldin-Meadow & Morford, 1985 as reformulated in Pizzuto & al, 2005). We use statistical analyses to assess the extent to which the use of these crossmodal combinations examined at different age points (12, 15, 18 months) can predict three measures of language development taken at two years of age: 1) onset of two-word utterances; 2) verbal complexity as mirrored in the frequency of two- and multiword utterances; 3) word repertoire. Results show that both complementary and supplementary combinations predict language development, but each combination type contributes in a distinct manner to the developmental process: supplementary gesture-speech combinations predict the onset of two-word utterances, while the use of complementary combinations at 12 and especially at 18 months appears to be a significant predictor of both verbal complexity and word repertoire evaluated at two years of age.

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The Transition From Gesture To Sign:
The Case Of Motion And Location Forms In British Sign Language

It has been argued that to develop spatial language, children must solve arbitrary form-to-meaning mappings in which semantic components are encoded onto linguistic labels. Because sign languages describe motion and location of entities through transparent movement and placement of the hands in space, child signers may find spatial semantics-to language mapping easier to learn than child speakers. This hypothesis was tested in two studies: a longitudinal analysis of a native signing child's use of gesture and British Sign Language to describe motion and location events between the ages 1;10 and 3;0 and performance of 18 native signing children between the ages of 3;0 and 4;11 on a motion and location sentence comprehension task. The results from both studies argue against a developmental advantage for sign language learners for the acquisition of motion and location forms while highlighting the special nature of gesture in children's early language development.

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Developmental Changes of Large-Scale Spatial Representation in Preschool Children

This longitudinal study investigated how large-scale spatial representation changed between the age of 4 and 6 years old. Fifteen children were asked to describe their route home from the nursery school once a year, for three years. Their spatial "Frames of Reference" (FoR) and point of view as indices of a spatial representation were inferred from their spontaneous gestures and speech produced during the route description.

Analysis of children's utterances and gestures showed that the mean length of utterance, speech time, and use of landmarks or right/left terms to describe a route, all increased with age. When children were 4 years old, most of them made gestures aligned with the actual route to their homes, and their hands tended to be raised above the shoulder. In contrast, as a 6-year-old, gestures were used to give directions that did not match the actual route, as if the children were creating a virtual space in front of themselves. They also tended to produce more gesture-units and to use a smaller gesture space than when they were younger. These results indicate that the development of FoR in preschool age may change from an egocentric FoR to a fixed FoR. The fixed FoR is based on external landmarks as a reference point. Moreover, some 5- and 6-year-olds depicted their routes as a map on the floor, which can be considered to represent survey mapping.

This study suggests that when children are 4 years old, they have a predominantly topological route representation but that by the time they are 5 and 6 years old, they also have a coordinated survey-type representation. This implies that a coordinated representation is available earlier than Piaget argued. Factors underlying the development of spatial representation such as verbal encoding skills and the commuting experience were also discussed.

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Session 7C: PANEL: EMBODIMENT (Recital Hall)

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Gestures For Thinking In Mathematics And Science

The purpose of this thematic panel is to bring together three studies that consider gesture and action within the context of learning mathematics and science. The overall goal is to investigate the ways in which mathematical or scientific topics are understood, utilizing gesture as a data source or teaching tool. Within each study, gestures are an integral part of thinking about and acting in constructing knowledge of the mathematical or scientific topic (Clement and Barowy, 1994; Crowder, 1996; Roth, 2002, 2003). While focusing on the learning of mathematics and science, the studies also test the generalizability of prior work on gesture, pointing to the need for a holistic framework that takes into account speech, gesture, action and all the available modalities that are used in making sense of and communicating about the world (natural, social, mathematical or scientific). The three presentations address three different content areas, and three different age groups. In the first study, adult students are asked to talk about and solve problems involving fractions, a basic yet poorly understood elementary mathematics topic. In the second study, secondary school students and teachers utilize gesture in building an understanding of graphing and algebra. And in the third study, elementary school students gestured, with objects, in the process of creating analogies to understand simple physics phenomena. General issues and questions raised by these three studies include the role and function of gesture in thinking and learning (Alibali, Kita & Young, 2000; Wagner, Nusbaum & Goldin-Meadow, 2004), the differences between spontaneous and consciously-produced gestures, the relationship between actions with objects, internal imagery, gesture, and memory, and potentially unique aspects of gesture use within mathematics and science contexts.

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Gesture And Mathematical Talk: Remembering And Problem-Solving

How does gesturing contribute to and/or express the ways in which a learner understands a mathematical concept? What role do gestures play in mathematical reasoning and problem solving? This presentation describes research that investigates these questions in the context of beginning to accumulate a corpus of gestures that accompany mathematical talk. The study involved 12 adult females, all students in an undergraduate mathematics course for prospective elementary school teachers. The topic was fractions, chosen because it has proven difficult for young learners and may be incompletely understood even by adults. The participants were interviewed and videotaped in pairs, both before and after the topic was covered in class. Mathematical talk and accompanying spontaneous gestures were elicited by asking the students what they remembered about learning fractions, how they might introduce fractions to children, and how they solved a set of problems involving fractions. A corpus of more than 100 gestures was collected and the accompanying speech transcribed. The gestures were analyzed in terms of McNeill's typology (McNeill, 1992) of iconic, deictic and metaphoric (now considered to be possibly overlapping dimensions rather than exclusive categories (McNeill, 2005)). However, the nature of mathematical inscriptions, which may refer to abstractions beyond themselves suggested a more textured analysis of certain gestures, one that takes into account the "chains of signification" in mathematics (Walkerdine, 1988). In addition to examining the entire corpus of gestures, the research describes a case study of a series of gestures that played an important role in reasoning about a specific mathematical problem. Within this context of describing past learning, current understanding, and on-the-spot problem solving, gestures played several important roles in the discourse. They served as memory traces of actions taken in the past as well as supports for in-the-moment visualization and reasoning. In general, gestures provide an important nexus for bringing together action, imagery, memory, and speech in mathematical talk and problem solving, and as such are deserving of deeper investigation.

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Traces Of The Body: Gestures And Graphing In School Mathematics

The coordinate system is the unavoidable residue of the eradication of the ego in that geometrico-physical world [Ö] a final scanty token in this objective sphere.   - Weyl (1918/ 1994) Over its history, mathematics as a discipline has traditionally valued Platonic forms of abstract, disembodied conceptualization over embodied, situated forms of knowing grounded in human life and culture (Rotman, 2002; Davis & Hersh, 1986). This valuation of the abstract has played out at all levels of mathematics education. But many students do not thrive in this purely abstract, cognitive realm, as evidenced by high dropout and failure rates in senior secondary mathematics (Ma & Willms, 1999; Audas & Willms, 2001). Even research mathematicians now object to the excessively algebraic emphasis in mathematical culture and education, arguing that much of mathematicians' actual work entails visualization and modeling (Whitely, 2002; Henderson & Taimina, 2006; Burton, 2001). Recently much interest has been focused on embodied and multimodal views of mathematics and math education, involving studies of gesture, kinesthetic learning and embodied metaphor and mathematical understandings (Lakoff & Nunez, 2000; Nemirovsky & Borba, 2003; Goldin-Meadow, Kim & Singer, 1999). This paper focuses on a study of embodied knowing in graphing in secondary mathematics education. Students and teachers in three secondary schools were asked to use gestures and sounds (but not technical descriptions) to describe given graphs on the Cartesian plane, and their gestural descriptions were videotaped. Results were analyzed semiotically and through post-taping interviews with participants viewing their own tapes. Findings include an intimate link between gestures involving the x- and y-axes and participants' embodied sense of the vertical and horizontal; relationships between gestural speed and temporal interpretations of static graphs; culturally-bound interpretations of left-right and up-down; an interesting speculation about eye movements tracking gestures and imagined embodiments of the graphs. This study suggests a new, embodied theoretical basis for educational innovations in the teaching of mathematics at the secondary level.

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Gestures And Analogies In Physics

While the importance of the creation of new analogies in the practice of science is well known (1966; Nersessian, 1992), we still do not understand how new analogies are made (Vosniadou & Ortony, 1989). Research on spontaneously generated analogies has been largely carried out with groups of adults with many years of experience in school science (Clement, 1988; Kaufman, Patel, & Magder, 1996; Wong, 1993a, 1993b), and does not help us to understand how students might generate analogies in the process of learning science. In this presentation, I will extend the limited work on students'own analogies (Duit, Roth, Komorek, & Wilbers, 2001; Pittman, 1999) into the elementary grades, and explore the role of gesture in this creative process. This presentation will seek to extend the work of numerous other researchers who have documented the role of gestures in expressing new ideas (Goldin-Meadow, 2001, 2003), by exploring how gestures can themselves participate in the process of creative thought (Alibali, Kita, & Young, 2000; Noble, 2003, 2005). In interviews about the behavior of a toy parachute, grade 3 and 4 students made gestures with objects that played a significant role in the construction and elaboration of analogies they created. The students'actions do not fit traditional definitions of gesture, but I have called these actions "gestures with objects," following Goodwin (2003) and Hindmarsh and Heath (2003), who have argued for the extension of the term gesture to such actions with objects. In the examples I will present, students used gestures with objects to merge the source and target domains, constructing conceptual blends anchored in the objects themselves (Fauconnier, 1997; Hutchins, 2005). I will explore how students' interactions with the objects allowed them to use perceptually apparent similarities between domains to generate analogies reflecting scientifically productive relationships.

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Session 7D: GESTURE MODES & EVOLUTIONARY PERSPECTIVES (Band Room)

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Are We All Artists? Gestural Modes Of Representation As Techniques Of Gesture Creation

Hands only sometimes turn into gesturing hands and in order to become gesture the hands undergo a transformation from practical to symbolic action (Müller & Haferland 1997). This talk spells out the techniques humans use when turning a manual movement into gesture. These techniques resemble the techniques artists use when transforming a perceived object into into a sketch, a painting, or a sculpture. A similar cognitive and practical process underlies the transformation of a perceived object or event into a gesture. The hands may be used to model a three-dimensional object, they may outline or draw its oval or rectangular shape, or they may embody the object and hence turn into sculpture themselves. Finally the hands may reenact actions that they usually perform such as opening a window or turning a car-key. It will be concluded that there are four different basic modes of gestural representation that underlie gesture creation (Müller 1998a,b).

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Gestural Modes Of Representation, Or How Hands Become Signs:
Linguistic distinctions, neurological foundations, and evolutionary implications

This talk will present first results of an interdisciplinary project which investigates the structural properties of gestures from a linguistic, a neurocognitive, and an evolutionary perspective. The focus is on one fundamental aspect of these structures, namely the techniques underlying gesture creation, termed gestural modes of representation (Müller 1998a,b). Four basic modes of representation are distinguished: the hands model a three-dimensional shape of an object, the hands outline the two-dimensional form of an object, or the hands embody the object (a flat hand embodies a piece of paper or a window), or the hands reenact an everyday activity such as opening a window or turning a car key.

In neuroscientific studies on patients with brain lesions and neuroimaging studies, similar categories (pantomime, body-part-as-object) have been found to be generated in different brain regions (Lausberg et al., 2003). On this basis, neuroscientific studies contribute to identifying formal and semantic structures of gestures. Comparative studies of gestural structures in human and nonhuman primates will investigate more closely which of the linguistically identified structures in human gestures are present in our closest relatives (Liebal, Müller and Pika, in press). This will sharpen our understanding of the different kinds of structures present in human gestures and reveal which aspects of the human techniques of gesture creation are also present in nonhuman primates. Determining exactly which structures overlap across primate species and which ones evolved uniquely with human language will contribute to the current debate in evolutionary anthropology that posits a gesture-first theory of language evolution (Hewes, 1973; Corballis, 2002) against one in which gesture and speech emerged in concert (Arbib, 2003, 2005; McNeill 2005).

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Social Cognition And Signaling Strategies In The Gestures Of Captive Orangutans

Several theories regarding the origins of human language propose that gesture was once an essential if not dominant medium of human communication. The ease with which great apes can acquire and use human signs and gestures, while their vocal communication remains predominantly inflexible, supports this theory of early hominid reliance on gesture. Recent research into the natural gestures of great apes has revealed that they possess extensive gestural repertoires and are able to modify, combine, and concatenate their gestures. The gesture sequences used by great apes are an ideal medium for investigating the relationship between social cognition and communication since self-modifications of failed signals inform us about the process of establishing shared meaning and which factors are assessed in choosing a communication strategy. In order to determine whether orangutans (Pongo pygmaeus) could vary or modify their gestures to clarify misunderstood signals, we performed an observational and an experimental study of captive orangutans. Our observational study showed that when interacting with conspecifics, orangutans used goal-directed signaling and altered the modality and use of their gestures in response to social cues such as recipient visual attention. In the experimental study, orangutans distinguished between cases where their gestures were completely misunderstood, or partially understood by a human experimenter and altered their subsequent communication attempts accordingly. When misunderstood, orangutans used a wider range of signals, avoiding those tried before. When partially understood, they were more likely to choose signals of the same modality and to repeat signals. The flexibility of gesture use observed in both

studies suggests that, like humans, orangutans are able to use their gestures to help clarify meaning and overcome miscommunication.

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11:00-12:00 Plenary Session: Keynote 3 (Concert Hall)
Karen Emmorey, San Diego State University, USA
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Some Perspectives On Gesture And Sign Language

In this talk, the relation between gesture and sign language is explored from linguistic, psycholinguistic, and cognitive neuroscience perspectives. "Co-sign" gesture differs from co-speech gesture with respect to the primary articulators (the face/body vs. the hands), the optionality of gesture (e.g., obligatory vs. optional deixis), and types of gesture (e.g., environmentally coupled signs vs. gestures). Further, by studying the co-speech gesture of bilinguals fluent in a signed and a spoken language, researchers can gain insight into the relation between gesture and sign language.   Recent research indicates that knowledge of American Sign Language (ASL) impacts the form and content of co-speech gestures produced by hearing signers when speaking English to non-signers. Psycholinguistic models of co-speech gesture must include mechanisms that can account for the appearance of ASL signs and ASL-influenced gestures accompanying the speech of "bimodal" bilinguals. Finally, neuroimaging studies reveal critical differences between how signers and non-signers process meaningful non-linguistic gestures. When observing pantomimes unaccompanied by speech, parietal cortices are extensively activated for hearing non-signers, but not for Deaf signers. The production of pantomimes, however, engages left parietal cortices for *both* deaf signers and hearing non-signers. Thus, signers may not automatically engage the mirror neuron system when perceiving pantomimes due to their expertise and experience comprehending human gesture. For Deaf signers, generation of pantomimes also engages more extensive regions within parietal cortex bilaterally compared to ASL verbs, reflecting the additional praxis and motor imagery required for pantomime. Overall, the study of how signers produce and comprehend gesture can yield new and unique insights into the psychological mechanisms and neural systems that underlie language and gesture.

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1:00-3:00 Parallel sessions

Session 8A: INTERSUBJECTIVITY AND INFANCY (Concert Hall)

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Face, Gaze Direction, Posture And "Voices"

A number of studies have established the existence of a strong relationship between vocal cues and changes in a speakers' stance towards the talk he/she is producing. In conversations, prosodic parameters often represent the only reliable signs of shifts of footing occasioned in discourse by the presence of reported speech (Cooper-Kuhlen, Bertrand). Prosody may reveal speakers' interlocutive attitudes in various ways: pitch variations, for instance, were found to indicate a speaker's anticipations (of agreement, or disagreement) regarding the addressee, or, conversely, a self-centered attitude, not taking the addressee's reactions into account (Morel & Bouvet).   This study is an attempt to investigate the extent to which bodily nonverbal parameters parallel vocal cues as possible signs of the changes in the speaker's positionings induced by the reference to other speakers' words.   Some of the changes in the speaker's perspective result from quotations of a known speaker's utterance, while others, in a more indirect and subtle way, are produced when less identifiable polyphonic "voices" are being staged in the speaker's utterance. Goffman's footing production format (in terms of animator-principal-author) as well as enunciative polyphonic approaches may be used to analyze this variety of summoned voices. This study is based on two distinct videotaped conversations (2x 1h), taking place in semi-natural settings. The analysis focuses on the utterances most clearly marked by presence of other speakers' words (in a variety of forms ranging from directly reported words to allusive speech). The co-occurring nonverbal behavior, with particular attention to aspects such as facial expression and movement, gaze direction, posture, and to a lesser degree, to manual gestures, are investigated.

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Subjectivity And Intersubjectivity In Gestures

It is now widely acknowledged that gestures are not sporadic movements of hands and arms. They encode significant semantic, pragmatic, social, cognitive, and discourse information. Consequently, gestures also show speakers' beliefs, attitudes, and emotions toward the proposition (i.e., subjectivity). Traugott and Dasher (2002) distinguish "intersubjectivity" from subjectivity. Intersubjectivity involves the speakers' attention to the addressee as a participant in the speech event, not in the world talked about, and hence it arises directly from the interaction of the speaker with the addressee (Traugott and Dasher 2002: 19-24). Though there has been a little research on gestural manifestation of subjectivity (McNeill 1992; Emmorey, Tversky, and Taylor 2000), there is no overt research on how intersubjectivity is manifested in gestures. The purpose of this paper is to show how gestures reflect subjectivity and intersubjectivity in Japanese face-to-face interaction. The paper focuses specifically on subjectivity and intersubjectivity that encode speakers'points of view in deixis and spatial use in gestures. It will present data, which come from videotaped Japanese discourse in which 45 pairs of participants were (1) conversing freely, (2) talking about what made them angry recently or in the past, (3) discussing differences among Japanese conventionalized idioms of anger, or (4) retelling a cartoon story which the speaker had just seen, in which deixis plays a key role. The findings suggest that there is a correlation between subjectivity and the gesture space and that the directionality of gestural motion encode speakers' points of view.

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Outside Observer's Sensitivity To Gesture Coordination

One's perception of the other speaker's gestures influences how they gesture for the same or related referents. The interspeaker influence on gesture formation can be seen in the similarity of gesture forms in terms of how various spatio-kinetic dimensions of the referent are mapped onto the corresponding dimensions in gesture. This coordinative aspect of gesture production is essential in interaction with more than two speakers. The goal of the present study is to see whether individuals who are not directly involved in an interaction (viz., outside observers) can detect coordinative uses of gesture through observation. It was hypothesized that if gesture coordination is part of everyday interaction, naive observers must be able to detect such instances of gestures even without explicit knowledge about gesture's functions. For the present experiment, stimulus video clips were prepared by sampling instances of gesture coordination between members of dyads during cartoon narrations. Observers watched the video clips, in which two speakers (presented separately by splitting the video image) were producing a gesture referring to the same object or event. Half of these clips included two speakers taken from different dyads (Pseudo Dyad clips). The other half included two speakers from the same dyad, actually talking to one another (Real Dyad clips). To prevent information in speech and facial expressions from influencing observers' judgments, the clips were presented without sound and the speakers' faces were blurred through editing. Observers were simply asked whether the speakers were engaged in the same interaction or not. It was expected that observers could make accurate judgments if coordinative use of gesture serves as a valid social cue for interaction. The results showed that although the accuracy level was not very high, suggesting that the task was not easy, the observers were more likely to perceive speakers in Real Dyad clips as actually talking to each other. This indicates that gesture coordination was perceived and used as a valid interactional cue by outside observers.

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Sentences And Conversations Before Speech?
Use Of Communicative And Symbolic Gestures By Preverbal Children

Before their first words children develop many communication and representation skills. Infants learn conversational rhythm through turn-taking and respond to speech in ways indicating comprehension. Can preverbal children string symbols together for more complex representations or engage in representational turn-taking? Use of symbolic gestures by infants provides a way to investigate preverbal symbolic and communicative capacities. I ask, Given adequate representational tools can infants form sentences and engage in conceptually focused conversations? Are these skills predicted by prior gesturing, or by caregiversí gesturing? I document the development of non-symbolic and symbolic gesture use in 10 typical infants (4 to 11 months at the start) over 8 months. Data were collected in a gesture-rich childcare classroom. Each child was filmed an average of 40 times in 5-minute interactions with caregivers. Microanalytic coding of films captured all gestures by children and caregivers, including the concept represented and the conversational context of each gesture. I use growth modeling to describe the average developmental trajectories of non-symbolic and symbolic gesture frequency as well as gesture sentences and conversations. I use qualitative transcript data to illustrate the content and context of conversations held between preverbal children and caregivers. Results reveal that infants form 2-gesture sentences as early as 9 months, and 3-gesture sentences at 1 year. Gesture sentence length was predicted by the frequency and complexity of caregiver gesturing. Infants replied to caregivers as early as 10 months, and engaged in 4-turn representational conversations as early as 11 months; maximum gesture conversation length was 16 turns. Conversation length was predicted by infantsí early gesture repertoire. Qualitative data reveal infantsí sophisticated use of gesture to make requests, describe observations, and discuss internal states of self and others.

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Session 8B: MATERIALIZATION (Rehearsal Room)

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From Gesture to Design: Building Cognitively Ergonomic Learning Tools

I introduce a design-research methodological framework for creating cognitively ergonomic learning tools through close analysis of learner–tools interaction. By 'cognitively ergonomic' (Artigue, 2002) I mean artifacts supporting tacit negotiation between "naïve" kinesthetic schemas from comportment in everyday situations and "scientific" epistemic forms (Collins & Ferguson, 1993) of mathematical problem-solving practice, such as symbolic representations (Abrahamson, 2004).

Spatial–numerical mathematical representations in use today evolved over millennia. Presumably, humans' embodied strategies played roles in creating, selecting, and perpetuating these objects. These same embodied strategies could enable students' re-invention of the historical artifacts—an ontogeny/phylogeny recapitulation underlying implementation of constructivist pedagogical philosophy (von Glasersfeld, 1987; Wilensky, 1997).

I demonstrate with empirical data of 28 4th-6th graders and 30 college students who each participated in a 1-hour Piagetian interview about a probability situation. I focused on students' gesture (Alibali et al., 1999) when they came up against the obduracy of available objects. For example, students estimating the ratio of green and blue marbles mixed in a box say "about half half" while gesturing "separating, measuring, and weighing." This 'mismatch' (Church & Goldin-Meadow, 1986) may indicate negotiation between embodied, dynamic, visuo–spatial knowing (gesture) and explicit, typological, "math talk" (speech; Abrahamson, 2003). A cognitively ergonomic learning tool, e.g., a 0-100 number-line placed alongside the box, would accommodate the embodied knowing and enhance its quantitative precision.

I present the gesture-to-design development of a computer-based dynamic visualization of the binomial function (http://edrl.berkeley.edu/Histo-Blocks.shtml). I compare students' behavior without- and with the tools to show how students' images are materialized in the tools' affordances.

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Does Counting Count? Counts, Gestures And Visual Signs

Counting, which in some ways resembles an ordered series of points, is a neglected topic within gesture research. This may be because instrumental action, of which counting is clearly an example, is conventionally treated as beyond the scope of gesture studies. We will look here at a particular example of a performed counting. The data comes from an elementary school science classroom. Four students, working as a team, have been tasked with designing a representation for a set of measurements that they have gathered (Lehrer & Schauble, 2004). They have been provided with a large piece of graph paper and are discussing how they might satisfy the assignment. A teacher/researcher working with the team, has suggested that they might start by determining how many squares they have on the graph paper and initiates the counting herself. My question is, does this action differ in its semiotic properties from a gesture? Counting represents the witness-able production of a locally-constituted set produced in such a way that it highlights what is to count as an element, what is not, and, where relevant, in what order. It has, therefore, both deictic (with respect to the elements) and iconic (with respect to the constituted set) features. In this way, counting actions, like more conventional gestures, can be analyzed as "formulations" (Koschmann et al., 2007) that perform specifiable work with respect to the production of local understanding. The presentation calls into question just what we should be taking as our topic of study. Gesture studies represented a useful corrective to the talk-centric tradition of linguistics research. By defining the scope of interest too narrowly, however, we run the risk of substituting one restricted perspective on human interaction with another. In keeping with the theme of this conference, this presentation joins other recent proposals in arguing for a broader conceptualization of communicative action, one that fosters a fuller appreciation of the practices through which we produce the world around us as understood.

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Gesture Without Interaction: Cognitive Uses For A Communicative Capacity

How quickly can you name the alphabet's 12th letter? How did you figure it out? Much work focuses on gesture's role as deeply integrated part of the human linguistic/communicative system (eg, McNeill 1992, 2005). This has reduced attention on a complementary hypothesis: that gesture, like instrumental action (Kirsh and Maglio 1992), may be used for cognitive goals in non-communicative settings. Humans do talk to themselves, and in some cases - as when reciting the alphabet to solve the problem above - this self-directed speech serves a functional rather than communicative role. When people talk to themselves, do they also gesture to themselves? If so, how do their gestures compare to those seen in interactive discourse? What purpose do such gestures serve? We filmed subjects solving various puzzles while alone. In our data, all subjects speak and gesture, and every problem elicits speech and/or gesture. Gestures often accompany speech, and co-time with it normally (though there are timing differences that affect both streams, eg, frequent multi-second pauses). Subjects point at the entities they discuss, count on their fingers, and build task-relevant real space blends (Liddell 1995). In other cases, "gestures" occur without speech, but remain similar to co-speech gestures - for instance, when examining a flattened cube, subjects produce folding motions, as if their fingers and palm form two faces of the cube. In still other cases, they perform actions that resemble traditional gesture, but have marked differences - for instance, when solving multiplication problems, many perform the full grade-school multiplication algorithm by writing on the table with their finger. This is a real space blend, but one that is far more complex and detailed than could normally be sustained in a conversation. This suggests that gesture (as well as speech) is available to play a functional role in non-communicative tasks, and flexible enough to adapt its form when doing so.

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Internalization Of The Motor Strategy In A Mental Rotation Task
As Revealed By Spontaneous Gestures

This study investigates how the nature of motor strategies changed in a mental rotation task by examining how the type and rate of the spontaneous gestures changed over the experiment. The participants were shown line drawings of two views of the same three-dimensional object, and asked to verbally describe how (i.e., the direction, axis and angle) one of the objects can be rotated into the position of the other. Participants spontaneously produced gestures during the description. We focused our analyses on two types of gestures, that is, manipulation gestures (gestures in which the gesturing hand has a grasping handshape, and the hand rotation represents a physical manipulation of an object by hands) and rotating object gestures (gestures in which the gesturing hand does not have a grasping hand shape, but stands for the rotating object itself, and the hand rotation represents the object rotation). Our results showed that, in the first few trials, manipulation gestures decreased while rotating object gestures increased (Experiment 2). Furthermore, over the experiment, the rate of both types of gestures decreased, and the rotating object gestures became further away from the stimulus object (Experiment 1). In addition, gestures indicating trial-and-errors in gestural simulation of rotation were more likely before the onset of verbal responses than during the verbal responses (Experiment 1). We concluded that participants used gestural simulation to facilitate the problem solving, and that gestural simulation of rotation initially takes a concrete object-anchored form (i.e., with the manipulation hand shape, performed near the object), but it gradually becomes more detached from the object and self-contained (i.e., the rotating hand representing the rotating object, performed far from the object), and eventually becomes fully internalized (i.e., no gestures). Thus, gestures reflect how strategies change in this mental rotation task.

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Session 8C: GESTURE PARAMETERS (Recital Hall)

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The Influence Of Visual Context On Gesture Perception

Gestures are meaningful segments in the continuous stream of body movements. An important question for cognitive and computational models of gesture understanding is what makes an observer perceive a body movement as a meaningful unit. Kendon (2004) proposed that dynamic features of the limbs' movements guide perception. The goal of my study was to examine whether the observation of limb movement alone is sufficient or whether other visual factors influence the perception of meaningful segments. The stimulus material consisted of 42 short video clips of persons describing different objects. For each clip, a stick-figure animation was created using data from tracking devices the describers were equipped with. The animations accurately reproduced the movement of the hands (including the fingers), the arms, and the head. In the experiment, 40 participants were asked to segment the stimuli with the sound turned off. They should mark intervals where, according to their own judgment, the hands or arms express content. For each stimulus either the original video or the stick-figure animation was used (video/animation condition). There was no restriction on the number of intervals and the start- and end-points participants could choose. The level of inter-subject agreement in the video condition was found to be higher than the corresponding values in the animation condition. Thus, the availability of additional visual information besides limb movement led to a convergence of the segmentations. The accuracy of the markings was assessed by comparing them to a "gold standard" created by an expert gesture annotator who had access to contextual information including speech. The deviation from the gold standard was significantly smaller in the video condition as compared to the animation condition. The results are interpreted as evidence against the assumption that gesture perception depends on limb movement alone. Other factors of the visual context seem to play a role as well.

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From A Typology To The Relevant Physical Dimensions Of Gestures

Since the 1990's, several Embodied Conversational Agents (ECAs), have been developed (Poggi *et al.*, 2005; Kopp *et al.*, 2003; Cassell *et al.*, 1999) aiming at giving autonomy and interactivity when conversing with users and other agents. Most of them use specific representation languages to describe agent's behavior, mental and emotional state. Wishing to be able to integrate each other works and to mutualize works, some researchers started to establish common representation languages (RL) for behavior and gestures (Kopp *et al.*, 2006). As a first task they are working toward establishing a common language for gesture repository (Pelachaud *et al.*, 2006). In our work, we aim to refine the gesture repository (GR) specification: since RLs aim to be player independent, GR needs to represent which are the relevant gesture parameters adapted at each specific player or for any type of applications. To establish such relevant gesture parameters, we have studied which are the parameters able to specify a given type of gesture and its variants. Our methodology focuses on the physical parameters of gestures that have a *semantic value*. From the typology of Calbris (1983), we have studied the gestures that are relative to the notion of refusal or opposition, and of negation. We describe these gestures in term of symbolic values along the dimensions of: configuration of the hand, position of the hand in space, laterality (is the gesture produced with one or two hands) and laterality properties (are the hands symmetrical, independent, positioned in relation to each other, alternative), and repetitivity. For the movement, we have collected a set of actions relative to the relevant dimensions of a gesture (*e.g.* the planar hand for gesture of opposition). This action usually constitutes the core of the gesture meaning, and is attached to a specific or some of the hand-arm articulations (we say "no" by the *action* of shaking with the raised index, either from the wrist or from the elbow). This description is then used to refine the gesture repository specifications and allow the ECA to produce variants of gestures.

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Integrating Subjective And Objective Measurements In Gesture Research

The often implicit nature of gestures provides a window to evaluate mental processes not acknowledged by individuals. Of particular interest are the interactions of gestures with other concurrent behavioral or electro-physiological signals, for example, speech. Most of what we know in this regard has been learned through the analysis of observable features in audiovisual recordings. While ideally, the extraction of analysis features should be devoid of any evaluator's bias, certain aspects of this process, like the annotation of gestures' type (e.g. phase and phrasing) and semantics, are still better achieved by visual inspection. A challenge remains in how to integrate objective and subjective measurements in such way that new information can be easily interpreted from both. We have developed a framework for measuring cross-correlations among features automatically extracted from video and audio streams together with other features manually added into the pool of data. This framework is composed of readily available software components coordinated from within the MATLAB environment. For the analysis of visual data, functions from the Image Toolbox permit the measurement of size, quantity, and direction of activity (e.g. subject's movements). For the analysis of audio data (e.g. subject's voice), several custom routines extract standard features like fundamental and formant frequencies, amplitude, spectral centroid and roll off, among others; several types of data generated from within Praat can also be included at this stage. In order to visualize the most important cross correlations among segments of these features, the system outputs its results as an XML document, which can be loaded into the popular annotation tool ANVIL for integration with the hand-extracted gesture features. The result is then reloaded into MATLAB for a definitive analysis of co-occurrences between the objective and subjective measurements. This framework offers seamless integration of the various data generated by these widely used applications in the field of gesture research under a single-button operation; that is, in most cases, all it takes for the system to generate its reports are synchronized video and/or audio files. Also, since all the control code is written in MATLAB, it can be scripted to generate cluster analysis across subjects and tasks.

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Computational Understanding Of Full-Body Gesture In An Interactive Arts Context

Gestures can convey both denotational and connotational meaning. Denotational meaning is the literal meaning; what is being depicted by the movement. Connotational meaning is the context- and person-specific meaning; how a particular instance of a movement is executed by an individual in context. For example, a person giving directions might depict the characteristics of a specific landmark with iconic gestures, while at the same time conveying information about their attitude toward the stranger in the speed and crispness of the gestures. Our present research focuses on connotational meaning conveyed by movement in an interactive arts context. We approximate connotational meaning computationally using principles of Laban Movement Analysis (LMA). We have developed an immersive environment in which expressive movement, made by both trained dancers and naive participants, can be extracted from data provided by a marker-based motion-capture system that is

integrated with a pressure-sensitive floor. This data is then analyzed to extract the LMA elements of shape and effort qualities. The environment provides unencumbered real-time feedback to the participants in the form of music and ambient lighting to encourage particular patterns of movement, and to allow participants to reflect upon the meaning conveyed by their own movements. In our talk we describe the experiences of movers within the space, based on both subjective and objective measures. We also describe the engineering challenges of sensing movement appropriately and understanding LMA concepts computationally, and our current solutions to these challenges. This work represents a full collaboration between artists, engineers, and psychologists. For the arts, it represents a novel paradigm in which dancer and composer become one. For engineers, it presents new computational challenges in sensing and analysis. For psychologists, it provides a test-bed for investigating nonverbal communication in detail.

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Session 8D: Prosody (Band Room)

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Identifying Beat Location In Conducting Gestures: A Temporal Adjustment Study

Previous work has revealed relationships between certain features of conductors' temporal gestures and observers' perception of the beat. For example, both acceleration along the trajectory and instantaneous speed have been found to correlate with beat location in laboratory-based synchronization studies. Other work has identified similar relationships in real-world settings. The present study develops this work by employing a temporal adjustment task designed to eliminate temporal lag inherent in the synchronization process. Method. Forty-six participants were presented with point-light representations of single-beat gestures produced by an experienced conductor. Each gesture was presented repeatedly and was accompanied by a short auditory tone with the same periodicity as the visual beat. For each gesture, participants adjusted the temporal location of the auditory tone until it matched the perceived temporal location of the visual beat. Four spatio-temporal variables ñ instantaneous speed, radius of curvature, absolute acceleration along the trajectory, and absolute change of radius of curvature ñ were then extracted from the gestures, and their relationship to participants' indicated beat locations examined using multiple linear regression. Results. Each gesture was analysed separately, and significant models emerged from all analyses, each accounting for 79%--88% of the variance in participants' responses. Absolute acceleration along the trajectory was the only significant variable in all models. Conclusions. The present study demonstrates that, when temporal lag associated with synchronization tasks is removed, beat location in conductors' gestures is related solely to acceleration along the trajectory. Thus, the induction of a visual beat is related only to changes in speed of movement, and not to overall speed of movement, direction of motion, or change in direction of motion.

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Perception Of Prosody In A Visual-Gestural Mode

Several linguistic cues (e.g. blinks, pause, preboundary lengthening) may appear at Intonational Phrases (IP) in American Sign Language (ASL) (Wilbur, 1994; Brentari & Crossley, 2002). This study examined the effect of experience with co-speech gestures (McNeill, 1992; Barkhuysen, 2006) for non-signers and ASL for signers on the ability to use visual-gestural prosodic cues in segmenting ASL grammatical units by examining which prosodic cues were most salient for each group.

The stimuli presented contained the same lexical signs, but different prosodic boundaries. For example: (1) [MARY PAINT SOLDIER OFFICIAL] [MARCH HERE]. "Mary paints official looking soldiers. Marching here." (2) [MARY PAINT] [SOLDIER OFFICIAL MARCH HERE]. "Mary paints. Official looking soldiers march here." Cues were present in target signs, (e.g. official and march are separated by an IP boundary in (1) but not in (2)). Participants judged whether a sentence break existed between the signs. Each answer was rated for degree of confidence.

Results indicate that signers and non-signers were able to use visual-gestural cues when perceiving boundaries in ASL. However, signers showed less variance on their confidence level. Performance differed significantly among the items ($p = <.01$). To further investigate this difference, each item was rated according to 1) strength of pause, hold and preboundary lengthening, and 2) the presence of blinks and dropping of the hands. Non-signers relied on multiple cues--pause, hold and dropping of the hands. Signers were most sensitive to the cue of pause. While pause and hold have a source on the linguistic domain, dropping of the hands may be associated with gesture-like cues.

We conclude that although both groups were sensitive to visual-gestural cues during this task, non-signers required several cues to perform effectively, whereas for signers only one cue was sufficient.

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Gestures Of The Face And Body As Proto-Prosody In A New Sign Language

Prosodic cues to the interpretation of language are universally present, whether the language is spoken or signed. While spoken languages rely mainly on vocal prosody which is augmented by visual signals, sign language prosody is entirely visual (Nespor & Sandler, 1999). It is thought that linguistic prosodic systems originate in signals that are prelinguistic and universal (Bolinger 1985, Ladd 1996, Gussenhoven 2004). However, since all spoken languages are old (or descended from old languages), it is impossible to observe the "original" system. This talk will present data from a new sign language which suggest that prosody already plays an important role in the interpretation of utterances. The data come from a newly emerging sign language in a Bedouin village in the Negev desert of Israel, Al Sayyid Bedouin Sign Language (ABSL). Genetic deafness and endogamous marriage patterns have resulted in a deaf population of about 100 individuals within this community of 3,500 over a period of 70 years. We have found that this new language has fixed word order (Sandler et al, 2005) but little other syntactic, morphological, or phonological systematicity. At the same time, signers are able to convey varied and complex information about a wide range of topics. A key to the expressive power of the language comes from gestures of the face and body of the kind that conventionalize into prosodic systems in older sign languages.

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3:00-4:30 Poster Session 2 (Concert Hall Lobby)

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An Exploratory Study Of Contexts Requiring Gestures With Japanese Refusals

Wilkins (2003) introduced the idea obligatory cospeech gestures for pointing behavior noting how he caused misunderstandings with Arrernte speakers when he didn't use the obligatory form. In a recent study of Japanese refusals (Jungheim, 2004) the presence of gestures with refusals of an offer also appeared to be obligatory as all participants performed a gesture with their refusals. The purpose of this exploratory study is to examine the extent to which Japanese native speakers feel that gestures are obligatory for the correct interpretation of refusals of an offer. Participants who performed refusals for evaluation were Japanese native speakers (n=17) and learners of Japanese as a second language (n=16). The native speaker interlocutor perspective was taken by two Japanese raters who evaluated the participants' output. Data were collected using 99 randomly ordered video clips of the participants interpreting three silent videos of persons refusing an offer of a drink. In the first stage, raters rated whether the transcripts of each of the responses was a refusal on a scale of 1 to 5. Two months later the same raters rated the videos themselves on a scale of 1-5 for appropriateness. Raters stated their ratings orally to a research assistant along with reasons for their rating. This was followed by post-rating retrospection. The results showed that ratings of the interpretations of the three refusals were consistently lower for the videos than for the transcripts. Interrater reliability was relatively high in the textual mode, but it was low in the video mode. Both raters included comments about gestures in some of their explanations as well as in their retrospections, but there were no instances in which they suggested that the absence of a gesture affected their rating. Results show that even though gestures can be considered part of the formula for refusals of an offer in Japanese, there are other factors that affect an observer's interpretation of intent.

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Facial Expression Tracking in Sign Language Videos

Facial expressions play an important role in sign languages, either at a lexical or at a syntactic level: they take part in the definition of a standar sign, the building of the sentence organization, the introduction of modalities and the switch between enunciation forms. The work presented here takes place in the field of computer aided analysis of facial expressions displayed in sign language videos. We use a formalism called Active Appearance Models (AAM) that is used to model a face and its variations caused by expressions, in term of deformations of a set of fiducial points on the face. Points on a face can be tracked with a good accuracy along the video when the face is not occluded and when it has been learned beforehand. The fitting algorithm proceeds, at each frame of the video, by iteratively minimizing a difference between the learned face and the face observed. In the context of sign language communication, the signer's face is frequently occluded, mainly by hands. A facial expression tracker has then to be robust to occlusions. We propose here to rely on a robust variant of the AAM fitting algorithm to explicitly model the noise introduced by occlusions. The main contribution is the automatic detection of hand occlusions. The idea is to model what the non-occluded face is, by the use of numerous examples that adjust model parameters, and to detect an estimate of occlusions as being what is not explained by this model. This estimate can be refined by the use of the iterative behavior of the AAM fitting algorithm: at each iteration, an estimate of the occlusions is computed and merged with the previous estimate. Experiments are conducted to characterize the performances of occlusion detectors. We also propose a way to correctly track facial deformations that occur in a long video sequence, by developing an alternative tracking strategy used when occlusion detectors fail on a video frame.

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Multiple Cues Tracking In Communication Gesture Videos

The interpretation of communication gestures relies on multiple visual cues. Those cues are emitted by different parts of the human body. They could be the position, orientation of the upper body, positions of the hands in the body or scene frame, according to the gestures being interpreted either deictic, iconic or metaphoric. Our approach is based on the use of local models to detect and quantify the body movements during a communication. The processed videos present people in the context of communication, as work presentation or sign language (such language is more dynamic than co-verbal gestures and contains several self-occlusions of body parts). Our models rely on different methods of image processing. We use the Active Shape Model method to retrieve the variation of the upper body orientation and retrieve the position of the shoulders, and we use Particle filtering method to track the head and hand positions in the image. The Active Shape Model represents a parametric deformable model : a statistical model of the global shape variation is built from a training set. This model is then used to fit a model to unseen occurrences of the object earlier annotated in the training set. We also correlate shoulders positions in this model. Particle filters, are sophisticated model estimation techniques based on simulation. They are generally used to estimate Bayesian models. We used them here because of the non-linearities of the human motions. We have evaluated the robustness of our models in case of high dynamic motions, occlusions and low video quality. We also have developed a joint model of the human arm and several animation methods (direct and inverse kinematic). Used in combination of the body pose, shoulder and hands positions, it can provide informations on the arm angular configuration and an estimation of the 3D position of the hands. The combination of those models is currently under development.

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The First Steps Of A Signing Avatar Project For The French Sign Language

This article presents the first steps of a signing avatar project whose role is to diffuse messages in French Sign Language (FSL) to deaf users. The system will be built on an internal representation of the sign language, in order to reach a level of acceptable quality of animation by these users. The sign language representations are based on specific models, both at the lexical and the utterance levels. Study of the FSL lexicon has thus led us to produce a formal lexical specification model based on a geometric, sequential representation that reflects the relative significance of body parts to a given sign by describing the contribution of all those involved, credits the parametric interdependencies deriving from sign definition; and affords the flexibility required for lexeme deformation in context. Instead of an n-tuple of discrete values, our model considers each gesture unit as a dynamic geometrical figure where every spatial component is unambiguously constructed through use of a formal language, in the same way as in classical geometry. At the utterance level, we use signing space representation as structuring foundation. Our representation is made up of appropriate entities and a three-dimensional Euclidian space. We have associated this representation with a set of methods for manipulating entities and their relationships, to allow updates of the signing scene. We introduce temporal and topological relations in the signing space to characterize classes of space-time structures, where the sign deformation in context, the gaze, the body movements and the mimics are expressed. We are currently developing a software platform for avatar animation that will subsequently enable us to assess the models and representations described here. This process is based on an iterative approach, for step-by-step evaluation of the various aspects modeled.

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Index Finger Gestures In Metalinguistic Comments On Polish Grammar And Language Use
The paper discusses pragmatic functions and semantic contribution of spontaneous index finger gestures produced by a Polish language scholar explaining language phenomena and normative standards of contemporary Polish. The paper analyzes video data coming from Multimedialny slownik Ojczyzny-Polszczyzny [The Multimedia Dictionary of Standard Polish], published in 2002. In 37 video clips included in the Multimedia Dictionary all cases of index finger gestures were examined, resulting in a sample of about 120 index finger gesture units with varying number of gesture strokes, found in 32 clips. The present paper discusses selected 11 cases of index finger gestures grouped into three categories:1)index finger gestures pointing to virtual language items, 2)index finger gestures accompanying exemplary sentences which illustrate the usage of a particular language item, and 3)index finger gestures used with performative verbs warning against incorrect language or recommending the use of standardized language forms. The aim of the paper is to show how the same speaker/gesturer differentiates among index finger gestures depending on semantic and pragmatic factors. Spatial orientation and formation of index finger gestures will be discussed in relation to the gestural contribution to semantic and/or pragmatic level of metalinguistic comments on the Polish language.

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Appraisal Into The Use Of Decontextualized Clausal Units In Gesture Research
The current research aims to re-evaluate the argument that spontaneous iconic gestures function primarily as a communicative device (e.g. McNeill, 2005; 2000; 1992). Following recent concerns from Beattie & Shovelton (in press.) that McNeill may have systematically overestimated the communicative power of iconic gestures, the present study investigates how the communicative value of hand movements change when the focus of analysis moves away from decontextualised clauses (the principal analytic unit central to McNeill's thesis) to encompass the wider narrative. Twelve participants were presented with three purposefully designed short films and were instructed to relay the main events of the stories to the experimenter. Using a "semantic features approach", 47 gesture-speech compounds were identified and individually scored for 24 semantic categories, at both the level of the clause and the wider narrative. The results indicated that semantic information indexed in gesture was significantly more likely to be distributed *elsewhere* in a speaker's narrative, than to be encoded exclusively in the target gesture. Additionally it was found that when semantic information was represented in both gesture and the wider narrative, the information was significantly more likely to be re-distributed before the target clause, than after it or both before and after it. Finally, information encoded in gesture was significantly more likely to be re-represented in the vocal channel than in gesture and that the semantic content of gesture was significantly more explicit than the concurrent information in the narrative. The findings are interpreted with respect to McNeill's theory and the semiotic nature of gesture.

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The Modulations Of Gesture Expressivity, And Of Intonation: A Same Nature?

This paper presents a general discussion on the results we obtained in the field of the pragmatic functions of gesture expressivity (fluidity, power, spatial expansion) during a conversational interaction.   In everyday life, we do interpret speaker's gesture expressivity as the expression of her emotional, mental or physical state. We have investigated the modulations of this expressivity over time, named breaks, in a corpus of 2D cartoons. We wanted to find out how animators use these breaks to attract the attention of the viewers through the movement quality of the 2D characters. We have observed that these breaks can act as a rhetorical relation of similarity on the one hand, and as a rhetorical relation of contrast on the other hand (Ech Chafai et al., 2006). The question that comes to us, is: if these functions are intuitively used by 2D animators to suggest some relations or effects, do the primitive nature of these breaks determine these properties, and is this phenomenon observable in other domains? We want to extend our work on breaks of expressivity and look at the role of the paralinguistic parameters of speech. In spoken language research, the notion of disjuncture between successive words can be linked with the relation of similarity through the rhythmical effect played by breaks (Beckman and Elam, 1997). Considering the modulations of the pitch, Gussenhoven (2002) states that the biological code named Effort, that corresponds to a variation of energy within the signal, derives from the speaker's intention to provide an important information; this notion of Effort is linked to the relation of contrast through the specification of a direct link between the form of the phenomenon and its function.   Finally, the study of expressivity across modalities (gesture and spoken language) leads us to refine our comprehension of both phenomena we observed during our analytical study, with a functional property on the one hand, and with a biological link between the form of the phenomenon and its function on the other hand. Our aim is to implement such properties in the modeling of embodied conversational agents so as to enhance their capabilities to attract user\'s attention when interacting with them.

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Complexity Of Cognitive Processing Influences Co-Speech Gesture Production

Melinger & Kita (2004) showed that gesture production depends on both linguistic and imagistic processes (see also Kita & Özyürek, 2003). It remains unclear, however, which factors determine these processes. This paper provides evidence for an effect of cognitive complexity as measured by reaction times (RTs) and error rates on different types of gestures. 12 participants were videotaped while describing 6 networks of 18 coloured dots adopting an intrinsic reference frame in speech. The perceived image and the verbalised target direction of the spatial situations were often incongruent (e.g., "right" in speech and "up" in the image). Replicating Melinger & Kita, some spontaneously produced co-speech gestures matched speech while others matched the image. Additionally, gestures regularly conveyed a mixture of the two directions of speech and image (e.g. a gesture pointing right and up accompanying "right" in speech in the context of "up" in the image). Departing from Melinger & Kita's interpretation that lateral direction influences gesture production in general, we investigated whether cognitive complexity affected production of the different types of gestures. Gestures matching the direction of speech were more likely to be produced in situations that were more difficult (as measured by RTs in a second experiment) and gestures matching the direction of the image were also marginally correlated with RTs in the same way (while neither gesture type showed a relation to error rates). However, gestures that conveyed a mixture of the two directions in speech and the image were not related to RTs but to error rates, and in the opposite way: situations with fewer errors were more likely to be accompanied by these gestures. Thus, these two measures of a task's cognitive complexity (RTs and error rates) distinguished the frequency of different gesture

types produced in the route description task. These findings highlight the importance of examining gestures in more detail in future research regarding the processes of gesture production and its functions.

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Individual Differences In The Perception Of Spontaneous Gesture Expressivity

Several studies have described the relations between movement quality and emotion (Wallbott 98). Most of them rely on behaviors displayed by actors when instructed with a single emotion. It is unclear how such observations scale up to more spontaneous behaviors and how they account for individual differences with respect to the perception of nonverbal and emotional behaviors.   We have collected EmoTV, a corpus of emotional TV interviews. Previous annotation and perceptual studies showed the presence of blends of emotions in these interviews.   In order to assess if the perception of gesture expressivity reported with acted data applies to such spontaneous blends of emotions, we selected 27 clips of our corpus (23 clips were rich in gestures and multimodal behaviors, and 4 clips did not contain any movement).   20 subjects (11 males, 9 females), age between 19 and 54 (average 32) had to annotate their perception of movement expressivity (hand, head and torso movements). Subjects had to mark on a line their perception of several dimensions of expressivity (Pelachaud 05): global activation (passive - active), repetition (once - several repetitions), spatial extent (contracted - expanded), speed (slow - fast), strength (weak - strong), and fluidity (jerky - fluid).   The 4 clips without movement were correctly annotated with low expressivity values. The following dimensions of expressivity were correlated across subjects: spatial extent, activation, repetition, and strength. Moreover these perceptive annotations were correlated with previous expert annotations of gesture expressivity for activation, repetition, and strength. Low or no correlations were observed between subjects for speed and fluidity.   We also performed several Principal Component Analyses of subjects'annotations. Extraversion and introversion (Eysenck Personality Questionnaire) enabled to distinguish between two groups of subjects. Extravert subjects rated all expressivity parameters with lower values than the introvert subjects. No effect was found for age and gender.

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Gestures Facilitate Rich Verbal Descriptions

Gestures are commonly produced with speech about spatial and motoric events. Gesturing about spatial events could make talking about those events easier in one of two ways. First, gestures could make it easier to think about the motoric and spatial relations involved, thus making it easier to describe those relations in speech. As evidence, Rauscher, et al. (1997) found that speakers who were prohibited from gesturing produced more disfluencies (e.g., um, uh) during clauses with spatial content than when they were allowed to gesture. Second, gestures could provide an easier way to express spatial relations than do words, thus making it easier to communicate about those relations with gestures because the spatial information does not have to be detailed in speech. As evidence, Graham and Heywood (1975) found that speakers produced fewer words describing spatial relations when they were allowed to gesture than when they were not allowed to gesture. We tested these two possibilities by examining the words 26 speakers produced when describing three motoric tasks: tying a shoe,

wrapping a package, and changing a tire. Half of the participants were prohibited from gesturing during their descriptions. We classified the verbs produced during key events as either "rich" (e.g., crisscross, loop, fold) or "non-rich" (e.g., put, make, do). Speakers who were allowed to gesture produced a higher percentage of rich verbs (M = 71%, SD = .11) than speakers who were not allowed to gesture (M = 45%, SD = .15), t(51) = 3.87, p = .01. These data suggest that gestures help speakers translate spatial ideas into richer verbal output, rather than supplementing speech with additional information.

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What Is Gesture, Anyway? A Perspective From Signed Languages

What is gesture? Is it defined by channel; the body, not the voice? Is it defined by cognitive mode; predominately icons, enactments, points, instead of abstract symbols? Is it defined by its structure; holistic, rather than discrete-combinatorial? For speaker-hearers, the answers point towards much the same core set of behaviours each time; speakers' gesture is a distinct communicative behaviour and a coherent theoretical concept. For signers, the answers point in three different directions, and "gesture: begins to disintegrate. This paper argues that, re-examined from a sign-based perspective, gesture is not a biologically or cognitively primary category of communicative behaviour. Rather, it is outcome of a basic human potential to flexibly adapt genuine primary resources--diverse channels, cognitive modes and structural patterns--into clearly-defined but developmentally secondary communicative tools. Under the dominance of speech, one such resulting tool is gesture, seamlessly integrated with speech. But under the dominance of signing, the primary resources develop different and indeed more varied parameters. The mature signer commands a significantly different--and structurally more sophisticated--set of communicative resources, and their integration with the still-identifiable non-gestural or "linguistic" module of the communication system has its own distinctive features. In this sign-informed approach, it is the primary resources, their range of parameters, and our capacity to weave them during development into functional communicative subsystems, that is *ubiquitious in human communication-- [and] is common between, and unifies--many kinds of communication*. Consequently, a sign-informed reconceptualization of gesture may have implications for many areas of gesture research, from neurocognition to evolution.

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Eyebrow Positions In Sign Language Of The Netherlands (NGT)

In this paper we present results on how NGT grammatical cues in the face can be influenced by affective meaning. Formally, facial expressions, as well as body and head postures are analysed as instantiations of sign intonation and prosody (Sandler, 1999; Wilbur, 2000). Following findings on intonation in speech (Gussenhoven, 2004) we expected that prosody in sign language can simultaneously carry linguistic and paralinguistic cues. In this study we studied the combinations of grammatical and affective functions of one phonetic domain i.e. eyebrow position. We elicited sentences that combined grammatical and affective meaning that both involved eyebrow position and analysed the position of the eye brows using the Facial Action Coding System (Ekman et al., 2002). FACS distinguishes all possible visually perceptible facial movement using so-called action units, which may involve more than one facial muscle. We elicited yes/no questions and wh-questions. In these sentences eye brows are typically up in yes/no questions and frowned in wh-questions (Coerts, 1992). In terms of FACS this translates into action units 1 + 2 (inner and outer brow raiser) for up and action unit 4 (brow lowerer) for frowned. These grammatical types were combined with affective meanings which are conveyed by using similar eyebrow positions i.e. anger (AU 4) and surprise (AU 1 + 2). In the elicited sentences combining linguistic

and affective functions of eye brows either the same AUs are required, or different AUs are required. Our results show that in cases involving different AUs, affective brow positions may override grammatical ones. Moreover, in all cases AU4 appears to be dominant independent of its function.

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The Organisation Of Spatial Constructions And Use Of Space In Sign Language

You will find below an analysis of spatial description in French sign language, with particular focus on how gesture and space can be associated. In this research, I have tried to analyze static description of space. By looking into certain underlying linguistic methods, I have noticed that some internal structures were recursive in sign language. When looking into the corpus data, I noticed that multi-linear spatial structures could be used following two different strategies (Cuxac, 2000), i.e saying and simultaneously showing, illustrative intent, and saying without simultaneously showing. Saying and simultaneously showing is full of iconic linguistic methods, such as form transfers and personal or situational transfers, these iconic practices stem from a semiotic intention which use an iconical intent of experience. On the other hand, saying without simultaneously showing is to be related to the triptych *pointing-looking -standard sign* which associates a part of the signation space along with the look, which activates sub-spaces, known as "locus" (Liddell, 1990) with the elements of the locating or located lexical. However, according to the strategies that were used it seems that the linguistic methods used to describe a state can be nearly dissociated from the methods involved when describing a location. The difference between both descriptions lies in the involvement of the speaker. Indeed, in all the examples which involve the description of a state, the triptych *standard signing-looking-pointing* is mostly used. When describing spatial constructions, I noticed a continuum between the high iconic and standard elements. The results could be used in a transversal study, which will help determine more precisely how information is organized in the communication of deaf people. This could also help uncover whether sign languages have a common or not.

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Going Beyond: What Gesture Shows Us About Students' Notions Of Graphs

This study examines how gestures of middle school students working with Cartesian graphs offer information about how students use graphs to ground meanings and interpretations of what the graphs convey. A sample of 40 middle school students across grades 6-8 participated in one-on-one videotaped interviews with the researchers, and both their speech and gesture was coded for strategy use and grounding behavior. When considering students, responses in both speech and gesture, results indicate that students tend to be either cognitively, spatially, or interpretatively grounded to the graph. We discuss how grounding to the graph in each of these ways affects performance on pattern generalization tasks using Cartesian graphs.

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The Image-Schematic Structure of Pointing

This poster uses a conceptual framework drawn from cognitive linguistics to analyze the idealized cognitive model associated with the most basic of human gestures: pointing. The poster introduces the cognitive model, describes its image-schematic structure, and examines pointing in both prototypical and non-prototypical cases. For a point to function, both pointer and addressee must share the cognitive model of pointing and understand that a particular action is to be construed as an instance of pointing. The cognitive model includes (1) a communicative act, in which a pointer uses an extended body part or surrogate (such as a held object) to direct an addressee's attention toward some intended referent; and (2) a visual search, guided by a particular combination of image-schematic structure. The visual search depends on a combination of center-periphery, source-path-goal, extension, and proximity schemas, and it involves the kind of visual scanning (a moving locus of visual attention) commonly associated with fictive motion. The center-periphery schema locates the source of the scan in the pointer's body (origo); the extended body part defines the scanning path; the extension schema projects the scanning path beyond the end of the body part along a continuous trajectory; and the expectation of a goal defines the search for a referent in the vicinity of this path, as guided by proximity. In less prototypical cases, pointing can function in the absence of center-periphery structure (in signs with arrows), without extension (in a touch-point), and in association with containment rather than proximity (in reading clock hours). It might thus be argued that only source-path-goal is necessary for pointing. Instead, this poster claims that the idealized cognitive model for pointing defines the conceptual prototype for a category with radial structure: the rich image-schematic structure of pointing in ordinary discourse is the central case from which the others are derived.

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'Big Hands': The Language of Gesture in Archaeology

According to Emanuel Kant, the hand is the external mind of humans. Many of the anthropomorphic representations in prehistoric art presents humans with hypertrophiated hands, which, like in contemporary diagrams of the human body 's activity and sensitiveness illustrated by individuals with small bodies and big hands, stress the importance of the gestures in traditional societies. Leroi-Gourhan, in one his master texts (1965), defines human hands as the meeting place where human possibilities in contact with external world were transferred. In other words, we are talking about a "semantic of action" which can be deduced from the study of the human gestures. The present paper is a critical analysis on archaeological prehistoric material with examples from prehistoric art (paintings, engravings or statues). The intention of both authors is to capture the sense of frozen gestures' language as an index of past human life.

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Facial Deformation Extraction When Face Rotates Out-Of-Plane

Active Appearance Models (AAMs) are statistical tools that can be used to model faces. An AAM is composed of a shape which is a deformable configuration of points and of a varying appearance component that are statistically learnt from a training set of images. It is difficult to fit accurately on images different from those of the training set. In the other hand the fitting can be very accurate on images of a sequence that are close to the training images.

In this context, the vertices of the AAM can be retrieved to analyse the face pose and expression. Let's call AAMPoseExpr this model that fits the face under varying pose and expression. The main problem is that those pose and expression data are intrinsically correlated due to the 2D nature of the model used. To decorrelate them and to extract the expressive data only, an AAM called AAMposeOnly is built on images that only represent the pose variation (expression remains to neutral state). The shape of the AAMPoseExpr fit onto a given face image is projected onto the AAMposeOnly shape generator space. The resulting point configuration is a good approximation of the face shape if the face displayed a neutral expression. The difference of expressive point configuration and neutral point configuration represents the feature displacement, i.e. the expression. The extraction of feature displacement must be done carefully since head rotation introduces distortion on feature geometry. Displacements are measured in 3D to get rid of most of this distortion: the neutral face shape bears with him the information on 3D head rotation. The expressive shape vertices are expressed in a coordinate system that is embedded to the neutral shape. Once retrieved in this adapted coordinate system, displacements can be expressed again in frontal face coordinates and be classified under a normalized form. The method is evaluated on five sequences to quantify the validity of the feature deformation recovery when head rotates.

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Iconic Gestures Associated With Nouns And Verbs In French-English Bilinguals
The nature of the speech-gesture relationship is under much debate. Butterworth & Hadar's (1989) Lexical Semantic Hypothesis proposes that iconic gestures arise from semantic information in spoken lexical items. Thus, gestures should convey the same information expressed in speech, and nothing more. The Interface Hypothesis (Kita & Ozyurek, 2003) argues that iconic gestures develop from an interface representation existing between linguistic and spatial thinking. This hypothesis predicts that gestures are influenced concurrently by linguistic structure and spatio-motoric features of the gesture's referent, which may not be verbalized. This study aimed to test these hypotheses with bilinguals, and to compare iconic gestures produced with nouns and verbs.

Bilingual French, English speaking adults saw Pink Panther cartoons and recounted them to a listener. They did this in each language with the same cartoons. We calculated instances where speech and iconic gesture conveyed matching information, mismatching information, and partially matching information. The proportion of speech-gesture matches and speech adds information to gesture was calculated for noun phrases, verb phrases, and noun-verb phrases.

A 2(English, French) by 3(NP, VP, NVP) repeated measures ANOVA performed on the proportion data showed a main effect of language (F(1,7)=18.56, p <.01. Bilinguals conveyed the same information in speech and gesture more often in English (M =.62) than in French (M =.36). No main effect of phrase type or interaction was found. One-sample t-tests were performed for all phrase types to see if the proportion of instances where speech and gesture convey the same information was significantly different from 1. We found each proportion differed significantly from 1, providing evidence against the Lexical Semantic Hypothesis. French-English bilingual adults often express different information in speech and iconic gesture. These results are consistent with the Interface Hypothesis.

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Planning And Generation Of Multimodal Communicative Acts

In face-to-face communication we use signals of various modalities: words, prosody, gesture, posture, face. Signals are either codified or creative, i.e., the signal-meaning links are represented in memory as a lexicon (see words or symbolic gestures), or created on the spot (iconic gestures or neologisms). How do we choose the modality to use in a specific situation? Why do we make a gesture instead of a word, a gaze versus a posture, or two or more of them? Based on the analysis of multimodal fragments, we present a model of the planning and generation of multimodal communicative acts. As an Agent has a global idea and a goal to communicate it, it first goes through an "opportuneness" filter: if it is better not to communicate it, you will not. If the filter is passed through, by considering the context (physical and social situation, the Addressee's goals, personality, cognitive and linguistic capacities), the Agent comes to specify meanings - perceptual, motoric and propositional - in the global idea, and for each piece or aspect of meaning looks for a codified signal or invents a new one. Our model assumes that you try to find codified signals before inventing new ones, and that you order the modalities to search them, hierarchically, from the most to the least likely to be used. The order is determined by the meaning to convey and by contextual, shared biological and cultural, and idiosyncratic style factors: to convey emotions facial signals are generally preferred, but if you talk in the dark or prefer prosody you will produce a prosodic signal. Once negotiated, among these factors, the final order of modalities, the Agent searches them for the right signal, and finally outputs it. If the goal of communicating is very important, multiple signals, or an enhanced form of one signal, are used for the same meaning.

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Mouthing: A Discourse Strategy in English-to-American Sign Language

The use of oral gesture during signing is the result of language contact. This oral gesture, commonly referred to as mouthing is a voiceless visual representation of words on a signer's lips produced concurrently with manual. It is prevalent among English-dominant bilingual sign language interpreters who use American Sign Language (ASL) and spoken English when interpreting for deaf consumers (Davis 1989; Weisenberg 2003). These individuals have the advantage of simultaneity: the two channels of expression are distinctly different: one, a visual-gestural channel, the other oral-aural. Sign language interpreters are highly concerned with their deaf consumers, level of comprehension when organizing highly abstract English discourse into a more concrete visual-spatial mode. They often resort to borrowing directly from the dominant language, English.

This study tested audience design effects during interpretation from spoken English to ASL. When engaged in translating from spoken English to American Sign Language (ASL), interpreters shifted their style primarily to accommodate their addressee. A style shift was measured by the rate of oral gesture. Based on an analysis of variance (ANOVA), $F_{(1,3)} = 11.11$, $p < .05$, the study demonstrates that the perceived cultural identity of the audience has more of an effect on oral gesture than non-audience factors such as topic.

A pattern of oral gesture reduction was also discovered. At least two experimental contexts contained technical terminolo was repeated. Often there was no manual equivalent in ASL; therefore subjects had to translate these terms by overlappi gesture and a manual sign with approximate meaning. Once the subjects had expressed the combination a few times, t gesture was reduced or removed completely.

Not only does this study confirm what is a commonly held notion in audience design, that people are adjusting their language in reaction to people, but also opens up an inquiry to the use of the interpreting context as a means of examining neologisms and language variability.

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Fidgeting Is Not Random: Rhythmic Leg Motion, Speech, And Gesture

As analysts, we focus on 'speech' and 'gesture'; we subdivide 'gesture' further into such categories as spatial 'iconics' and prosodic 'beats'. We do not know how these categories relate to one another; and even the speech/gesture distinction can be unclear in signed languages. It may be useful to consider these in relation to other movements: self-adjustments, weight shifts, fidgeting, etc. However, little is currently known about their relation to speech or gesture. We present preliminary work on one such class: rhythmic motions produced by (usually) the legs and feet. In one film, a Speaker describes an image to a Listener. The Listener produces rhythmic motions during "boring" segments – during repetitions, and before interrupting. These motions are precisely timed to the Speaker's production, and could function as a form of backchanneling. However, they stop exactly when the Listener speaks or gestures; why? It is also unclear why rhythmic motion is associated with boredom/impatience at all.This association may also vary between individuals. In another film from the same study, the Listener produces rhythmic leg motions and nods that are co-timed with Speaker's emphasized words. In this case it does not seem to pattern with boredom; in fact, at some points the listener stops fidgeting shortly before interrupting, the opposite pattern from that described above.In other data (not yet fully analyzed), speakers engaged in mostly monologic storytelling produce similar motions. This is not backchanneling; it seems, provisionally, linked to narrative flow. It is also cross-linguistic; a Tzotzil storyteller recorded by John Haviland shows this behavior. Nor is this restricted to interaction. One subject, talking to herself while alone, pauses her speech and simultaneously begins rhythmically kicking the floor. Her legs stop just as she resumes speaking. Later, she speaks her solution into a microphone, and repeats the phrase that immediately preceded her earlier pause. She does not pause now, but does initiate another foot kick. These motions can thus be sensitive to not just the precise timing, but also the internal structure, of co-produced speech. All together, this fidgeting has a distinctive form across a wide variety of contexts, and a subtle network of regularities in its behavior.

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4:30-6:00 Parallel sessions

Session 9A: WORKSHOP: ANNOTATION TOOLS (Concert Hall)

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Workshop: Choosing Among Tools For Annotation And Analysis Of Multimodal Language

Many tools have been developed for annotation and analysis of multimodal language data. Researchers often struggle to choose the one that will best support their research. The advantages offered by new, developing, technologies must be weighed against the utility of tools a researcher has experience with, though these may depend on platforms at risk of obsolescence. A decision in favor of a given tool is guided by usability and learnability issues, cost, and by the possibility that the tool can constrain as well as augment a user's analysis options. An ISGS'05 workshop (http://vislab.cs.vt.edu/gesture/multimodal/workshop/index.html), attended by more than 100 researchers, initiated a community-wide discussion of these issues. For ISGS'07, we propose to hold a second such workshop, designed to advance the discussion already begun, address a wider range of

analysis issues, and engage more community members. We propose a 90-minute thematic panel, comprising presentations by researchers who are active users of the featured tools (to include Anvil, ELAN, C-BAS, FinalCut, Theme; others). Presenters will compare past experiences with other tools for annotation/analysis with their current experience using their tool(s) of choice. Presentations will include demonstrations of how to use the tools and their functionalities. Presentations and a wrap-up discussion of the tools' capabilities and limitations will be moderated by Rohlfing and Duncan, authors of the report on the ISGS'05 workshop (Rohlfing, Loehr, Duncan, et al. 2006, Gespraechsforschung, www.gespraechsforschung-ozs.de). This workshop for software endusers is intended as a companion to the separate workshop for tools programmers/developers: "Annotation Interchange between Multimodal Annotation Tools" (Loehr & Rose). The latter will bring developers of many of the same tools featured in the workshop proposed here and they will be available to endusers during the conference for questions and consultation.

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Session 9B: PANEL: MOTHER / CHILD (Rehearsal Room)

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Mothers' Communications Across Infant Age, Situation, And Culture

Gestures, language, gaze, and touch are core channels through which mothers communicate with their infants. Because infants undergo rapid changes in language, cognition, social and motor competencies in the first two years, mothers must continually modify their communications to accommodate childrens' development. Mothers also vary their communications from situation to situation in line with changing task demands (e.g., book reading versus teaching). Consequently, mothers' interactions with their infants are in constant flux, shifting from moment-to-moment, situation-to-situation and across developmental time. Finally, mothers' communications are influenced by culture. Change in the demographic landscape of the U.S. has prompted heightened interest on mother-infant interactions across ethnic groups. In this symposium, we examine changes to mothers' communications across modalities, nested time frames, situations, and cultural contexts. Presenters describe mothers' communicative strategies to their 12, 18, 24 and 36 month old infants. In home and laboratory, mother-infant dyads are videotaped while they share books about emotions versus numbers (Study 1); as mothers teach infants known versus unknown shapes (Study 2); and while mothers encourage and discourage their infants from walking down safe and risky slopes (Study 3). Participants include Anglo American, Mexican, Dominican and African American mothers. Together, this set of presentations moves beyond gaze-based interpretations of mother-infant shared attention to emphasize gesture, language and touch in dyadic communications. Discussion highlights the multiple channels mothers use to orient their infants' attention, regulate their actions and provide referential information, and explores the role of mothers' expectations, task demands and ethnicity on mothers' communications

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How Do Children's Age And Knowledge Shape Mothers' Messages?

Researchers have examined mothers' communications with children of different ages. However, traditionally age is confounded with children's knowledge. In this study we sought to unravel the influence of these two variables on mothers' communications and to describe to describe the functional aspects of mothers' language and gestures. Fifty-four mothers of 18- and 36-month-olds participated in a laboratory task. First, mothers reported the shapes their children knew by name. Based on each mother's report, 3 shapes were selected as "known" and 3 as "unknown". Mothers and children sat at opposite sides of a table, separated by a divider that obstructed the view of each other's side of the table. Dyads received 18 trials (3 blocked trials for 3 known shapes and 3 blocked trials

for 3 unknown shapes). Mothers' task was to get their children to hand them a target shape. Children's task was to choose the shape among three shapes. The functional aspects of mothers' communications were classified into three categories: Attention getting (orienting children); Referential (providing information about the shapes), and Regulatory (directing children's actions). Children's age affected mothers' communications. In language, mothers of 18-month-olds used more Attention strategies (e.g., "look there") and Regulatory strategies (e.g., "give it to me"), whereas mothers of 36-month-olds used more Referential strategies (e.g.," looks like a house"). Overall, mothers of 18-month-olds used more gestures than mothers of 36-month-olds. Childrens' knowledge influenced the referential aspects of maternal language and gestures. Mothers labeled known shapes, whereas for unknown shapes they used descriptions and pointed out similarities to familiar objects. Mothers primarily relied on descriptive gestures to depict the physical structure of the shapes (e.g., drawing the shape in the air) for the unknown shapes. Mothers' use language and gestures as ways to scaffold their children's learning.

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Cultural Styles Of Mother-Infant Communication In Book Sharing And Teaching Task

Past studies of mother-infant interactions indicate that mothers use explicit behaviors to initiate and maintain episodes of shared attention. Mothers both respond and direct infants' attention and actions through gestures, gaze and language. However, it is important to examine alternate patterns of sharing attention in culturally diverse groups. Here, we examine mothers' language, gestures and use of body position, posture and contact in dyadic communications. These strategies were contrasted in different settings   We visited 200 Dominican, African American, and Mexican mothers and their 14-month-old infants in their homes. Dyads were videotaped in three tasks: (1) sharing a wordless number book, (2) sharing a wordless emotion book, and (3) collaborating on bead-stringing. Behaviors coded included: (1) pointing, (2) gaze to object and partner, (3) object touch, (4) dyad position in a face-to-face or mother-behind-infant position, (5) hand vs. body contact, and (6) mothers' language and infant vocalizations. Patterns of maternal communication varied by task. Mothers were more likely to sit opposite their infants and to look at their infants' faces during the emotion book . During the number book, mothers were more likely to sit behind their infants and to display body contact. Mothers and infants used pointed more in the number book task . Mothers used more labels and discrete, shorter utterances when sharing the number book, and used more conversational narratives when sharing the emotion book. During bead stringing, mothers and infants faced each other, and hand-to-hand contact was increased. Mothers used referential language to comment on bead color and shape, and seldom talked about the act of stringing beads. We are currently examining the sequential nature of mother-infant interactions and contrasting patterns of communication across the three ethnic groups. These findings advance an understanding of how mothers and infants from different backgrounds share attention through the multiple channels of touch, contact, gesture and language.

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How Mothers Encourage And Discourage Their Infants' Motor Actions

Typically, in studies of infants'use of social information, mothers are limited to a single modality (facial or vocal affect) using a scripted message to encourage and discourage infants'responses to ambiguous situations. However, little is known about the ways mothers use the multiple modalities of emotions, language, and gestures to coax or dissuade their infants'actions in potentially risky motor tasks. We observed how 24 mothers of 18-month-olds encouraged and discouraged infants'actions on safe and risky slopes when their messages were unconstrained. Overall, mothers displayed positive facial and vocal affect while conveying their messages using verbalizations and gestures. Encouragement and discouragement were not exclusively positive or negative; mothers praised infants more often when discouraging than when encouraging. Verbal messages regulated infants'actions and location on the slope ("Walk", "Stay") and voiced general support for infants'behaviors ("Come on"). When discouraging, mothers used simple prohibitions ("No"), regulated infants'actions and location by instructing them to, "Sit down" and "Stay", oriented infants ("Hey"), and described the task and consequences of inappropriate actions ("It's steep," "You'll fall"). A rich array of gestures enhanced mothers'verbalizations providing visually salient information indicating location and the referent slope. Mothers used conventional (claps) and iconic gestures depicting the actions they wished their infants to carry out. Like verbal information, gestures were tailored to the condition; claps were highly prevalent in encouraging trials and pointing doubled in the discouraging trials. These findings reveal the multimodal quality of mothers'encouragement and discouragement as a means to communicate safety and danger. Possibly, multiple signals across modalities offer infants who are unable to yet benefit from formal language a choice of what to attend to when making decisions about action.

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Session 9C: EMBODIED VIEWPOINT (Recital Hall)

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Seeing It First Hand: Information Source & Character Viewpoint Gestures

Co-speech gestures can represent events from a number of perspectives. For example, an utterance like he was running down the street might be accompanied by a gesture in which the speaker takes on the persona of the runner (character viewpoint). Alternately, the same speech might be accompanied by a gesture in which the speaker's hand traces the path the runner took, as though she were observing the scene from afar (observer viewpoint). These alternatives reveal a crucial difference in the extent to which the speaker is actively embodying the content of her speech, and provide valuable information about the speaker's underlying mental representation. The work presented here compares narrations generated on the basis of a visual stimulus to narrations generated on the basis of a verbal description, in an effort to determine which factors lead to a fully embodied representation of an event. 40 University of Chicago students participated in the study in pairs. One participant (referred to as the narrator) watched a cartoon stimulus, then described it to his or her partner. The stimulus was designed to evoke gestures in both character and observer viewpoint. The partner (referred to as the summarizer) then summarized the narration. Gestures were compared to determine whether narrators or summarizers produced more character viewpoint gestures. The mean number of character viewpoint gestures was higher for narrators than for summarizers ($F(1,38) = 4.17$, $p =.04$). These results suggest that generating an internal representation from a verbal description (rather than from a visual stimulus) may make participants less likely to actively embody the content of their narration. Because participants may also be less likely to produce character viewpoint gestures for content that is discourse-old (as is the case when summarizing a narration), the study is currently being extended to distinguish the effects of these two factors.

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Gestural Expression Of Emotions In Narratives About Sport Competitions

Gestures are strictly related to mental imagery and thus convey the visual content of meaning (McNeill, 1992): but, as mental imagery research shows (Lang, 1979), they also communicate the motoric and emotional content of meaning: a motor program and an emotional response with related somato-visceral activation are included in a mental image. This work presents a study on the relation between gestures and emotions in narrating sport competitions. In telling about competitions, the athletes give much importance to the emotions felt therein, and sometimes re-live them. Our hypothesis is that when people talk about an emotionally loaded experience they use gestures to represent iconically the related somatic response. Thirty track and field athletes were asked to tell about their best and worst performances and to re-live those experiences, including the pleasant and unpleasant emotions felt. Mental imagery techniques were used to assure perfect recall and to induce athletes to experience those emotions again. The athletes answered questions about vividness of the images produced, intensity of muscular movements and tactile sensations, and about the imagery viewpoint, internal, external or mixed (Murphy, 1990). Videorecordings were analyzed to assess if the best and worst performances evoke different imagery quality and different gestural production. Results show the presence, beside iconics, beats, metaphorics, and self-manipulations, of gestures referred to emotions, namely: gestures that express emotions by reproducing the particular state of tension, relax or easyness experienced during the race; gestures that describe emotions; self manipulations revealing the emotional state. The athletes make more gestures expressing emotions in narrating best performance, while self manipulations and gestures describing emotions are more frequent in telling about the worst. The quality of kinestetic and tactile feelings is better in good performance imagery. The high frequency of emotional gestures in the telling of best performances and the quality of kinesthetic and tactile recall suggest the possible role of gestures in expressing the motor-emotional content of the image.

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Session 9D: SPECIAL CASES OF GESTURE (Fiske Hall Room B1)

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Amer-Ind Gesture Comprehension By Older Adults With Alzheimers Disease

Much of the research on gesture comprehension among adults with acquired brain damage, such as dementia of the Alzheimer type (DAT) and aphasia, is difficult to interpret because gestural stimuli were not well-defined and were not rated for ease of understanding. One solution is to employ a standardized, readily understandable system of gestures, such as Amer-Ind Gestural Code (Skelly, 1979). Gestural stimuli for the present investigation were therefore selected on the basis of previously-determined degrees of transparency ("guessability") for older adults. Participants in the present study were 24 older adults (61-89 years): eight with early-stage DAT (EDAT); eight with middle-stage DAT (MDAT); and eight elders with no evidence of brain damage (NBD). Exclusion criteria for all participants included significant visual acuity and visual-perceptual deficits. Results revealed that Amer-Ind comprehension was significantly more accurate for the NBD than EDAT and MDAT groups, and significantly more accurate for the EDAT than MDAT group (p<.0001). Importantly, Amer-Ind comprehension was significantly more accurate for high transparency than for low transparency gestures (p<.01) for all three participant groups, suggesting that gesture transparency is an important factor to consider in future studies of gesture comprehension.

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Gestures and Sign Language in Normally Sighted individuals and those with Retinitis Pigmentosa and Usher Syndrome

Usher Syndrome (US) is an inherited condition which combines deafness with a progressive reduction in the visual field from teens onward caused by Retinitis Pigmentosa (RP), which may progress to total blindness. It has been empirically observed that signers with US reduce the space within they sign (signing space) as RP reduces their visual field. Two explanations have been suggested: some role of visual feedback in sign production (in addition to proprioceptive feedback); or an attempt to induce the conversational partner to adapt the size of his/her signing space to fall into the reduced cone of vision (ìtunnel visionî) of the person with US. In order to explore the phenomenon of reduced signing space and why it occurs, we used infra-red emitters and cameras to measure the positions of markers placed on the hands of subjects while they described pictures representing arrangements of dolls' house furniture. Four groups were studied: signers with US, normally sighted deaf signers, normally hearing people with RP, and normally hearing/sighted people. The RP and normally sighted hearing controls provided data on co-speech gestures accompanying English; the US and normally sighted deaf controls communicated in BSL. The size of each participant's visual field was obtained using a standard Visual Field test (Goldmann perimeter). This was compared to their signing or gesturing space. Our results provide for the first time a quantitative measure of signing and gesturing space used in conversation, mapped onto individual visual field. Results indicate a close match between the size of the visual field and the size of signing and gesturing in the presence of visual impairments for both the Usher and RP groups. These findings support the hypothesis of a role for visual feedback in calibration of the size of sign and gesture space, since RP subjects can comprehend their partner's linguistic message in spoken English whether or not the gestures are visible.

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How Do Feet Gesticulate?

Talking with a thalidomide victim, a man without arms and with very reduced legs, I noticed his engagement moving his eyes very expressively in different directions, opening them wide, raising and lowering his eyebrows, closing them, shaking and nodding with his head, and using his feet to produce beats. Then I saw that, like gestures performed with the arms and with the hands, his beats were more than beats: his feet and toes also performed small, but very well articulated movements, for instance, accompanying a negative sentence as kind of negative sign, or reinforcing a verb of movement, showing some content features like path or manner. There were "feet gestures" that moved some fictive object away from the body, other that neared a fictive object to the body, or indicated a place in a limited interactional space. A few seconds of a micro-analysis of a face-to-face interaction between a physically normal and a physically deficient speaker will work out aspects intended to explain   a) how some modalities--for instance gaze, head movements and feet-gestures - can substitute for others--like arms and hand gestures, and trunk movements; b) if the modalities performing "new" functions relate to words and prosody differently in respect to function (polifunctions), meaning(s) and synchronization. The situations considered are: pointing, thinking, searching for a lexical element, structuring discourse and explaining a path.   The theoretical background for the analysis of verbal and nonverbal signals consists of a functional classification frame considering four levels of interaction and the group of conversational signals, based above all on principles of the theories of Conversational Analysis, Discourse Analysis, Konversationsanalyse and Contextualization Theory. For prosody analysis the principles of Interactional Linguistics were followed; as for the analysis of nonverbal communication, the results of nonverbal communication research developed in different areas of human sciences were considered.

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9:00-12:30 Parallel sessions

Session 10A: PANEL: NEUROCOGNITION (Concert Hall)

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Neurocognition of Gesture

The neurocognition of gesture is a young, exciting and fast developing field that promises to lead to major insights into the brain structures and functions underlying gesture production and processing. The growing body of research in this field provides the empirical basis for developing cognitive theories on gesture perception and production. These findings are not only relevant to gesture research per se, but to cognitive neuroscience more generally, by promoting gesture research as a vehicle to understand other cognitive processes such as language, spatial cognition, prosody as well as emotional processes. In order to gain an insight into the neurocognition of gesture, we have invited six speakers who will discuss a wide spectrum of research topics and methodologies currently used in neuroscientific gesture research. The common focus of the panel is on the relation between gesture and language. The six presentations offer a range of views, from a close integration to a separation of language and gesture systems. The gesture ñ language relationship is examined in the context of production and perception. Gentilucci and Lausberg et al. will discuss whether speech / language production and gesture production are controlled by a common system or whether they represent separate production processes. Holle et al., Hubbart et al., and Skipper et al. will provide data on gesture perception and discuss how gestures and speech are integrated (Batons; Iconic gestures; Hand/face movements). Kelly et al. present data on how beliefs about the intentionality of the gesturer influences this perception process. As a second objective, the project panel intends to give an overview of the latest neuroscientific methods used in gesture research: Transcranial Magnetic Stimulation (Gentilucci), electrophysiological measures, i.e. Event Related Potentials (Kelly), functional Magnetic Resonance Imaging (Hubbard, Holle, Skipper) and split-brain research (Lausberg).

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Separability Of Speech And Gestural Systems: Evidence From Split-Brain Research

The finding that right-handers with left hemisphere language dominance prefer the right hand for communicative gestures is a fundamental argument for neuropsychological, psycholinguistic and recent evolutionary theories on language and gesture that propose a close association between speech and communicative gesture production. However, several studies have reported an equally frequent use of the right and left hands in gestural communication and more specifically, different hand preferences for different gesture types, such as batons or physiographs. We investigated hand preferences and gesture types during three personal interviews in four patients with complete callosal disconnection, and as control groups, five right-handed patients with partial callosotomy and ten right-handed healthy subjects. Three of the four patients with complete callosal disconnection, all with left hemisphere speech and motor dominance, exhibited a reliable left-hand preference for communicative gestures despite their left hand agraphia and apraxia. Furthermore, no significant right hand

preferences were found in the two right-handed control groups. The gesture type analysis revealed that the right and left hands displayed different gesture types. We conclude that the patterns of hand preference cannot be explained by speech lateralisation nor by handedness. As in split-brain patients the left hand is controlled by the right hemisphere, the data demonstrate that communicative gestures can be generated in the right hemisphere, independently from speech production. Furthermore, the specific gesture types that were executed by left hand suggest that gesture production in the right hemisphere is associated with right hemispheric functions such as spatial cognition or emotional processes. In contrast to the traditional neuropsychological and psycholinguistic theories on communicative gesture production, the present findings provide evidence for a separability of speech and gestural systems.

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The Integration of Gesture and Speech May Be a Default but Not Exclusively Automatic Process

Research has demonstrated that hand gesture influence language comprehension using behavioral (Goldin-Meadow, 2003) and electrophysiological measures (Kelly, Kravitz & Hopkins, 2004). Recently, ERP research has demonstrated that attributions about the communicative intent of gesture (i.e., whether interlocutors believe that gesture and speech belong together) modulate the neural integration of the two modalities during language comprehension (Kelly, Ward, Creigh & Bartolotti, in press). The current study extends this work by more subtly manipulating beliefs about the intentional relationship of speech and gesture. Participants watched short videos of gesture and speech that conveyed semantically congruous and incongruous information about actions. In half the videos, the gender of the speaker and gesturer were the same (Intent), but in the other half, they were different (No Intent). In this way, participants should infer that for Intent stimuli, the gesture and speech belonged together, but for No Intent stimuli, they did not. A behavioral task required participants to indicate the gender of the speech portion of the videos. As an index of gesture-speech integration, ERPs compared the N400 effect of the congruous and incongruous gesture-speech pairs. The behavioral results demonstrated that participants were faster to identify the gender of the speech when gestures were congruent versus incongruent with the speech. The ERP results revealed that participants produced a larger broadly distributed N400 to incongruous versus congruous gesture-speech pairs regardless of the intentional relationship between the speaker and gesturer.

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Session 10B: CROSS-LANGUAGE TRANSFER (Rehearsal Room)

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The Effects Of American Sign Language On Co-Speech Gesture

Does knowing a sign language impact the nature of co-speech gesture? We investigated this question in two studies. Study 1 compared co-speech gesture production by hearing native ASL-English bilinguals (N=13) and non-signing English speakers (N=12). Study 2 compared co-speech gestures by hearing students before and after one year of classroom exposure to either ASL (N=12) or Spanish (N=7). In both studies, subjects were shown clips of a Tweety and Sylvester cartoon and asked to retell it in English to a non-signing English speaker. Co-speech gestures were compared with respect to rate, type (iconics, deictics, beats), and handshapes. Study 1 revealed a clear influence of ASL on co-speech gesture. Nearly 70% of native signers (9/13) produced at least one ASL sign while speaking. Native signers also produced more iconics (74% vs. 67%), fewer beats (13% vs. 21%), more handshape types (14.5 vs. 11.1), and more unmarked handshapes (82% vs. 68%) than non-signers. However, the rate of gesturing did not differ between groups. Study 2 also revealed a significant effect of learning ASL on co-speech gesture. Paralleling the results with native signers, ASL students exhibited an increase in iconics and a decrease in beats after one year of instruction (iconics: 68% before vs. 81% after; beats: 28% before vs. 15% after (trend)). ASL students also showed an increase in gesture rate (.45 vs. .54 gestures/second). Comparisons of co-speech gesture before and after one year of Spanish showed no significant differences. These results suggest that acquisition of ASL changes co-speech gesture such that it resembles sign language through the insertion of signs, and increases in use of iconics, unmarked handshapes, variety of handshapes, and gesture rate. We hypothesize that acquisition of ASL impacts the gesture-speech interface because both gesture and sign utilize the manual modality.

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Evidence For Cross-Linguistic Transfer In Gestures

Anecdotal reports provide evidence of so called "hybrid" gesturer whose non-verbal behavior of one language/culture becomes visible in the other. The direction of this gestural transfer seems to occur from a high to a low frequency gesture language. The purpose of this study was therefore to test systematically 1) whether gestural transfer occurs from a high frequency gesture language to a low frequency gesture language, 2) if the frequency of production of some gesture types is more likely to be transferred than others and whether 3) gestural transfer can also occur bi-directionally. To address these questions, we investigated the use of gestures of English-Spanish bilinguals, French-English bilinguals, and English monolinguals while retelling a cartoon. Our analysis focused on the rate of gestures and the frequency of production of gesture types. There was a significant difference in the overall rate of gestures: both bilingual groups gestured more than monolingual participants. This difference was particularly salient for iconic gestures. In addition, we found that French-English bilinguals used more deictic gestures in their L2. The results suggest that knowledge of a high frequency gesture language affects the gesture rate in a low gesture language.

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Two-Faced: How Knowledge Of A Sign Language Affects Facial Gesture

American Sign Language (ASL) utilizes non-manual, facial and body configurations to mark syntactic constructions. For example, conditionals are marked with a raised brow, while wh-questions are marked with a furrowed brow. These non-manual markers may have been co-opted from the co-speech gesture accompanying American English, but over time, developed a systematicity not observed in facial gesture: the non-manual markers are tightly timed with the onset of the relevant clause. To investigate whether knowledge of the facial grammar of ASL affects the production of facial gestures, we elicited conditional clauses and wh-questions in English from 12 hearing native signers and 11 non-signing English speakers in a paired conversation with a non-signer. Conditionals and wh-questions in ASL were also elicited from the same bimodal-bilinguals paired with a native ASL signer. We recorded, coded, and timed the onset of the facial expressions that co-occurred with the spoken English or signed ASL sentences. We predicted that non-signers would produce ASL-like facial expressions because of the possible gestural origin of these expressions but that they would do so at a lower rate than signers. Only signers were predicted to time facial expressions with the onset of the clause, as they do in ASL. The results confirmed our predictions. Forty-eight percent of conditional clauses were produced with a raised brow for nonsigners, compared to 79% for signers. Furrowed brows accompanying wh-questions were less common for both groups: 5% (non-signers) vs. 37% (signers). Only signers timed their facial gestures with the onset of the clause. These results support the hypothesis that some non-manual markers of ASL are derived from the facial gestures produced by American English speakers. The timing results indicate that bimodal bilinguals produce ASL nonmanuals, rather than facial gestures, while speaking English, suggesting that knowledge of ASL impacts the gesture-speech interface.

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Session 10C: METATHEORETICAL PERSPECTIVES (Recital Hall)

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Gesture And Aphasia: Helping Hands?

The study of communicative gesture has broad relevance to theory, diagnosis, and treatment of neurologically-based disorders like aphasia. The general (psycho)linguistic literature on gesture production in aphasia is fundamentally limited in a number of ways, and attention to these limitations is essential for both systematic investigation and the clinical application of gesture for people with aphasia. This presentation will outline two prominent theoretical perspectives on gesture production which are distinct in their proposals about the function of gesture and where gestures emerge in the communication stream. Then, the influence of each of these theoretical perspectives will be discussed in relation to other critical components of an investigation (e.g. development of research questions, choice of gesture elicitation methods, and identification and implementation of an explicit coding scheme). In addition, this presentation will consider three elements as prerequisites to advancing the gesture production literature: operational definitions, coding systems, and attention to the temporal synchrony characteristics of gesture. With these elements in mind, a general working definition of communicative gesture will be proffered. Finally, this presentation will emphasize the importance of obtaining knowledge about individual variability in typical adult populations as a backdrop against which to assess and manage gesture use in a disordered population like aphasia. In summary, a marriage is needed of sound theoretical orientation, operational definitions, and measurement approaches, to yield valid and replicable studies of gesture production.

Only then will we make progress in determining whether, and how, the clinical application of gesture in aphasia will provide a "helping hand."

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Explaining Gesture Timing In Ontogenetic Development

Many aspects of gesture use in children remain to be explored. One issue of huge theoretical importance that calls for a developmental approach is gesture timing: temporal details of gesture performance in relation to simultaneously delivered speech.

Gesture timing can be shown to depend on (1) contingencies of face-to-face interaction between speakers and (2) sequential and semantic aspects of verbal language in utterance production of single speakers. Although these two kinds of explanations need not be mutually exclusive, authors focusing on interaction tend to describe timing as a form of "achievement" or "recipient design" (Kendon 2004; Goodwin 2000) while authors more interested in psycholinguistic explanations tend to use causal terms such as "synchrony" (McNeill 2005), emphasizing that breaking the patterns of habit requires special effort (Clark 1996; Pickering & Garrod, 2005). Consequently, quite different aspects of gesture timing become highlighted. For example, psycholinguistic theorists seldom account for endpoints of gestures, whereas researchers more apt to emphasize the ongoing interaction often do so. Still more importantly, the nature of the agency involved often appears quite different in the two perspectives.

Gesture timing in children becomes increasingly more complex when multi-word utterances emerge around 18 months (Goldin-Meadow & Butcher 2003; Özçaliskan & Goldin-Meadow 2005; Caprici et al. 1996, 2005). In the present study, gestures of three Swedish and three Thai children were studied by using a longitudinal video corpus with monthly recordings from 18 to 27 months (Zlatev, Andrén and Osathanonda ms). The children interact with their caregivers and peers at home. In my presentation I will show how both typical and deviant cases of gesture timing can be analysed in relation to the perspectives (1) and (2), and will suggest that a synthesis of both types of explanations is ultimately required in order to account for the observations.

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Metaphors In Motion: Cognitive And Communicative Functions Of Gesture

What cognitive or communicative functions do metaphorical gestures serve? How do they compare with the functions of literal gestures, and what do they mean for theories of language and concepts? In this paper, we describe a series of experiments in which literal and metaphorical gestures were either elicited or inhibited, to elucidate relationships between mental representations of physical space and mental representations of abstract conceptual domains that are typically described using spatial metaphors (e.g., value, rank, time). Results showed that speakers' spontaneous gestures were overwhelmingly consistent with the spatial schemas implied by their utterances, regardless of whether space was used literally (e.g., the rocket went up) or metaphorically (e.g., my grades went up). This was true even when abstract concepts were described without using any spatial language (e.g., my grades got better). Participants who were prevented from gesturing produced more verbal disfluencies when describing literal and metaphorical spatial concepts than those who were allowed to gesture freely. Further experiments manipulating the visibility of the gesturer and recipient showed that gestures corresponding to literal spatial concepts appear to be designed for the listener, but surprisingly, gestures corresponding to metaphorically spatialized concepts may principally serve internal cognitive functions for the speaker. Finally, dual-task experiments on language processing during simple motor actions suggest that motor programs, themselves, may be the "active ingredient" in the cognitive functions of both literal and metaphorical gestures. These findings indicate that people recycle some of the mental representations used for reasoning about physical motion and

space in order to instantiate abstract concepts, and also underscore the importance of conducting experimental interventions to complement observational gesture studies.

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Session 10D: PANEL: GAZE FOR CONVERSATIONAL AGENTS (Band Room)

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Gesture and Gaze in Humans and Machines

In recent research on multimodality, after the pioneering studies of Kendon (1967) and Argyle and Cook (1976), eye gaze is again being the focus of attention. Gaze is important for initiating the interaction and setting the focus of attention (Peters, 2006); it cooperates in the management of face-to-face interaction, both for turn-taking (Goodwin, 2000; Bavelas and Chovil, 2000; Rossano, 2005; Streeck, 2006) and for manoeuvres of feedback and own communication management (Allwood & AhlsÈn, 2006). The importance of gaze is witnessed in mother-child interaction (Trevarthen, 1984) as well as in classroom interaction (Rosenthal & Jacobson, 1968; Taeschner, 2005), that are both sustained by joint attention and mutual gaze. And it is found essential in human cooperation (Tomasello 2006). Attempts are also made at discovering the semantic import of gaze and its systematicity, finding out its specific meanings not only as a regulator of interaction but as a device to tell things (Kreidlin, 2002; Emmorey, 2005; Poggi, 2002, 2006, 2007); with some scholars even maintaining the possibility of writing lexicons of gaze. All of these attempts have had a resonance in the construction of Embodied Conversational Agents, which have started to exhibit realistic communicative gaze behaviour (Pelachaud et al., 2005; Maatman and Marsella, 2005). The panel presents some research on gaze behavior in humans, and some applications of it in the construction of Embodied Agents. Heylen's paper proposes the construction of a generative lexicon of gaze; Poggi explores the relations between gaze and gesture; Pelachaud, Peters and Bevacqua study gaze as an expression of interest and as a signal for initiating and carrying on dialogue.

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Multimodal Interaction: The Relation Between Gesture And Gaze

Within research on the relationship among different communicative modalities, the speech-gesture pair is generally the most studied one. Yet, also the movements of eyes are often very strictly intertwined with hand movements, both in instrumental action and in communicative acts. For example, in piano players the movements of the eyebrows often participate with and accompany the hand movements aimed at playing; in the same vein, an eyebrow raising is often synchronous with a beat gesture; again, sometimes a particular type of gaze can dis-ambiguate the meaning of a gesture; and finally, in Sign Language research the nonmanual component of gaze has been found to convey lexical and syntactic meanings to be added to simultaneous hand movements. So, what are the relations between gesture and gaze? Do they share the task of communicating meanings in the same way as speech and gesture do? How is this task distributed between the two modalities? Do they generally convey each a particular type of meanings, or do they exchange roles in sharing the semantic import of a multimodal communicative act? The paper explores the relation betwee gesture and gaze. Starting with a model for the analysis of gaze in terms of its signal and of its meaning, it analyzes the gesture and gaze behavior of Speakers during political discourse, focusing on the gestures with a persuasive import. An annotation sheme is proposed for the analysis of gesture-gaze relationships. Each item of gaze is analyzed in terms of its formational parameters: mophological an behavioral aspects of the eyebrows, eyelids, eye-sockets, wrinkles, eye humidity and reddening, direction of the eye and its relation to direction of trunk, face and Interlocutor. Then a literal and an indirect meaning are attributed to the analyzed gaze item, these meanings are classified according to a semantic taxonomy, and its relation is assessed with the meaning of the concomitant gesture.

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Principle-Based Analysis And Generation Of Gaze Behaviours

When does a person look to the interlocutor and when does he look away from him? One can distinguish different methods of investigation. In the first type a corpus of interactions is analysed the distribution of gaze behaviours in the corpus with respect to variables such as prosodic-syntactic units, turns or moves, information structure, etcetera. In a second type of investigation, the same kinds of analyses took place, but the collection of conversations was organized in such a way that there were systematic variations between them so that a comparative analysis between factors could be made. For instance, one might systematically vary the number of participants, the gender of the participants, the dominance relation between particants, or their cultural background. Variations in the patterns of gaze can then be attributed to these variables. Based on the observations made in this study, the patterns induced, one can try to make a further step and state explanatory principles behind this organisation. The same kinds of principles may, in some cases, also have been derived at deductively, which is a third kind of method of investigation. Starting from what one knows of the organisation of conversation or the principles of social interaction one might be able to infer particular implications for the patterns of gaze. The various investigations have resulted in a body of knowledge on various levels: from behaviour in specific instances to patterns and from patterns to general principles. Conversational agents need to be able to generate the appropriate behaviour given a context specified by many of the variables that have been considered in these studies. One way to capture the body of knowledge is in the form of a gaze lexicon, a database of form-meaning mappings in which a specification of a particular behaviour configuration is mapped to the functions it serves. The lexicon-view provides a convenient format from an implementational point of view. However, the format of a simple lexicon does not allow for the expression of general principles and rules. In this talk, we consider formats for lexicons comparable to proposals in the computational linguistics field of research (for instance, generative lexicons) that do allow such generalisations to be stated

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Model Of Gaze Behaviors In Conversation Settings

Embodied Conversational Agents are autonomous entities capable of engaging in dialog with other agents or with users. Among the communicative capabilities ECAs should be endowed with, an important one is to be able to pay interest to what is being said as well as to show interest. Gaze behavior, with its close links to visual attention, may be one such strong indicator of interest level. Our aim is to create non-obtrusive ECAs; that is ECAs that are able to detect when to start a conversation and how long to maintain it, as well as ECAs that are active listeners, that is ECAs that are able to participate in the conversation even when not having the speaking turn by providing appropriate feedbacks to the speaker. Both of these capabilities are based on synthetic perception tailored specifically for ECAs, encompassing models of synthetic vision, attention and memory. All three models interact with each other in order to collect and store information and orient the ECAsí senses with respect to the environment. Social perception processing is based on a Theory of Mind model. Two metrics have been defined as being of key importance to these processes, namely level of attention and level of interest. They are used in our model of conversational initialization to detect likely situations when the other agent may be interested in starting conversation. Regarding the second capability, ECA being an active listener, we aim to develop what we call a reactive and cognitive feedback model. The reactive model triggers a feedback depending on the speakerís behaviors. No semantic analysis is needed. On the other hand, the cognitive feedback model requires to know the mental state of the agent and determines if the agent agrees, accepts, believes and so on with what the speaker is

saying. But at first we have to define two properties of the feedback signals: which meaning is attached to a signal and what is the temporal relation and synchrony level between speakerís behaviors and listenerís ones. We are elaborating perceptual test studies to look into these two properties. In our talk we will present our models and describe how they are embedded in our ECA system.

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11:00-12:30 Parallel sessions

Session 11A: PANEL: NEUROCOGNITION, Part 2 (Concert Hall)

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An fMRI Investigation Of The Processing Of Co-Speech Iconic Gestures

In face-to-face conversation, speech is often accompanied by gestures. For example, speakers illustrate certain contents by means of iconic gestures which are hand movements that bear a formal relationship to the contents of speech. The meaning of an iconic gesture is determined both by its form as well as the speech context in which it is performed. Thus, understanding an iconic gesture requires a listener to integrate auditory and visual information. The present study investigated what brain areas are involved in this integration process using fMRI. To this end, subjects watched videos in which sentences containing an unbalanced ambiguous word (e.g. She touched the mouse) were accompanied by either a meaningless grooming movement, an iconic gesture illustrating the more frequent dominant meaning (e.g. animal) or an iconic gesture illustrating the lesser frequent subordinate meaning (e.g. computer). The main results are that when contrasted with grooming, both types of gestures (dominant and subordinate) activated an array of brain regions consisting of the left posterior STS, the inferior parietal lobule bilaterally and the ventral precentral sulcus bilaterally. The activation in the posterior STS is suggested to reflect the semantic integration of gesture and speech. This result extends previous findings in showing that the STS is not only capable of integrating audio-visual information with a somewhat clear form correspondence (e.g. lip movements and speech) but also participates in much more complex audio-visual integration processes (i.e. iconic gestures and speech) at a semantic level. The network of frontal-parietal activations is interpreted as a neural correlate of the mirror neuron system decoding the goal of the gesture movements which in turn may facilitate gesture-speech integration.

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Giving Speech A Hand:
fMRI Evidence Of Beat Gesture/Speech Integration In Non-Primary Auditory Cortex

As long ago as 60 A.D., rhetoricians recognized a type of gesture that conformed to the rhythm of speech (Quintilian, 1920). Dubbed batons and beats by gesture researchers, this category of gesture has continued to be understood in terms of its link to the rhythm of speech and has been shown to have a relationship with stressed

words (Efron, 1941; Kendon, 2004; McClave, 1994; McNeill, 1992). Here we used functional magnetic resonance imaging (fMRI) to investigate how this fundamental type of gesture (beat gesture) impacts speech perception during natural face-to-face communication. While undergoing scanning, 13 native English speakers listened to speech coupled with matching beat gesture, meaningless hand/arm movements, and a still torso. Speech and beat gesture segments were culled from video recordings of natural, spontaneously-produced speech and accompanying beat gesture recorded in a conversational setting. An environmental obstruction of the speaker's neck and head was used to remove known indices of fundamental frequency and phonemic content. Bilateral superior temporal gyrus and planum temporale (PT) showed reliable increases in activity for listening to speech with accompanying beat gesture as compared to listening to speech accompanied by a still body. In region of interest analyses, right PT was identified as a site of multisensory beat gesture/speech integration. These findings are consistent with prior reports of significantly greater activation in bilateral PT for processing prosody-related aspects of speech such as changes in fundamental frequency, melodic pitch sequences, and speech intonation (Barrett & Hall, 2006; Meyer et al., 2004; Warren et al., 2005). As right PT, in particular, has been shown to underlie processing of covert singing and listening to singing (Callan et al., 2006), the present findings on beat gesture support a theory wherein the right PT plays a pivotal role in processing rhythm-related aspects of speech.

Session 11B: PANEL: INDIVIDUAL DIFFERENCES (Rehearsal Room)

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Some People Do And Some Don't: A Thematic Panel Towards Understanding The Sources Of Individual Differences In Gesture Production

There is wide variability in how much individuals gesture when they speak. Little is known about the sources of these individual differences, although previous work has suggested that personality, culture, and cognitive factors may all play a role. Gaining understanding about the sources of individual differences in gesture production can lead to greater theoretical understanding about why speakers produce gestures. The purpose of this thematic session is to bring together investigators who are interested in identifying the sources of individual differences in gesture production.

The participants of the thematic session are all broadly interested in how the strength of an individual's mental representations influence his or her gesture rate. Greg Trafton, Susan Trickett, and Patrick McNight will present an analysis of speech-accompanying gestures as they relate to the expertise of the speaker. Do speakers who have more expertise about the information they are speaking about gesture more than novices? Mingyua Chu and Sotaro Kita will present an analysis of the gestures produced during a mental rotation task. Do gestures during a mental rotation task relate to spatial performance? Finally, Autumn Hostetter and Martha Alibali will provide an analysis of the tendency to convey information uniquely in gesture during a narrative task. Do speakers' verbal and spatial skills influence their tendency to use gestures to convey unique information while speaking? Taken together, the papers indicate that gesture production varies as a function of cognitive factors, including expertise, verbal skill, and spatial skill.

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Dealing With Individual Differences In Gesture Analyses

The first way is to examine some individual difference variable(s) (e.g., memory span, spatial ability, etc.) on a large group of participants and perform correlational or median split analyses to show the importance (or not) of each individual difference variable measured. The second way researchers deal with individual differences is simply to ignore them and assume that individual differences are part of the "noise" in any statistical analyses that are performed. The problem with this latter approach is that a subset of individuals may be driving the overall effects that are under investigation. For example, a few participants who gesture a great deal may be the primary cause of the effect under investigation. This is a particular concern for gesture researchers, since most people who study gestures do not run large N studies. We will use generalizability theory to explore several well-known gesture effects (e.g., the co-occurrence of spatial language to iconic gesture production) and show how much of the effect is due to individual differences. We will also explore the impact of individual differences for rates of gesturing. These analyses will be examined in the context of a project examining how expert and journeyman scientists discuss (and gesture about) their work.

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Individual Difference In Gesture Production In A Mental Rotation Task

Gesture production varies greatly across individuals. Many factors, such as culture, personality traits, cognitive skills and etc., may contribute to these individual differences. The goal of current study is to examine how spatial abilities correlate with the frequency of gesture production. This study investigates the spontaneous gestures in the classic Shepard-Metzler's (1971) mental rotation task. The participants were seated alone in an experimental room, and responded with two foot-pedals, leaving their hands free for spontaneous gestures. They did not talk during the experiment. We conducted two sets of analyses. First, we compared performance on the mental rotation task between gesturers and non-gesturers. Second, for gesturers, we correlated the number of gestures per trial and the mental rotation performance, and we also compared their mental rotation performance between trials with and without gestures. Both the error rate and the reaction time of the gesturer group were significantly higher than those of the non-gesturer group. This was the case even if we restricted our analysis to only the trials without gestures for the gesturer group. This indicates that the high error rates and slow reaction times in the gesturer group was not caused by gesturing. Rather, the gesturer group was in general poorer at the mental oration task than the non-gesturer group. Furthermore, for the gesturer group, there was a significant positive correlation between the number of gestures per trial and the better mental rotation performance. Within subject analysis shows that the error rate of trials with gestures was significantly higher than that for its counterpart trials without any gesture. The gesture rate was significantly higher in difficult trials than in easy trials (easy vs. hard was defined by the degrees of required rotation). We concluded that people with poorer spatial abilities depend more on their gestures, and difficult spatial problems trigger more gestures.

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Cognitive Skills Predict Frequency of Nonredundant Gestures

Abstract for submission (characters maximum): Speakers differ in how frequently they gesture, and past research has shown that gesture rate varies as a function of verbal and spatial skill. Individuals with good spatial skill but poor verbal skill gesture more than other individuals (Hostetter & Alibali, in press). In addition to the variation in frequency, individuals also differ in the extent to which they express information in gesture that they do not also express in their speech (i.e., ìnonredundant gestureî). The tendency to produce nonredundant gestures may also depend on the speakerís spatial and verbal skills. Specifically, when an individual has good spatial skill and is thus able to visualize rich spatial images while speaking, she may be particularly likely to convey these rich spatial images in gesture. However, when the speakerís verbal skills are comparable to her spatial skills, she may encode the information conveyed by her gestures in speech as well. Thus, we propose that speakers whose spatial skills outstrip their verbal skills are particularly likely to use gestures that are nonredundant with their speech. We tested this hypothesis by asking 38 speakers to describe a brief cartoon. Gestures were assigned meanings using the coding scheme developed by Alibali, Hostetter, Ryan, and Evans (in prep). Importantly, this coding scheme identifies 13 gestures for this particular cartoon that can be assigned a specific meaning based on form alone, without reference to the accompanying speech. We then compared the meaning assigned to each gesture to the meaning expressed in the accompanying speech. As predicted, we found that individuals whose spatial skill outstrips their verbal skill produced a higher percentage of nonredundant gestures (M = 31.9%) than individuals whose cognitive skills did not show this pattern (M = 17.1%), F(2,37) = 3.62, p = .03. This finding suggests that, at least for some speakers, gestures may be a way of expressing rich spatial information so that it need not be encoded in speech.

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Session 11C: AUTISM (Recital Hall)

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Educational And Home Settings Can Change Gesture Use:
A Case Study Of A Child With Autism

Autism is a developmental disorder which impacts on the social, communicative and cognitive abilities of the child. Pragmatic abilities are the most severely affected and the development of both language and gesture is delayed. Previous research indicates that deictic gestures are generally good, but representative gestures are impaired. A case study is presented of a child, Nathan. At the time of the recordings Nathan was aged 2;6 and attending an intervention programme aiming to facilitate his social and communication abilities. He was video recorded on the programme and at home interacting with an adult. The interactions were analysed in terms of collaborative achievement and gesture use in the two environments. In the educational setting the therapist directs the interaction. Three distinct phases can be identified; the therapist first engages Nathan's attention by means of deictic gestures, in conjunction with reading the text. As the interaction progresses she introduces representational gestures to talk about the pictures. In the final phase Nathan contributes more to the interaction. At home Nathan successfully guides the interaction himself, but it does not develop into different phases. He combines words, deictic gestures and eye gaze to interact with his mother, who becomes a willing participant. Thus it can be seen that Nathan is skilled at understanding and using deictic gestures. However he imitates, rather than spontaneously uses, representative gestures. He can both follow the lead of another in an educational setting,

and shape his own interactions at home. He achieves this through a complex integration of different communication resources. Although it is not possible to generalise from a single case study, this study indicates that children with autism may have more strategies to help shape communication, and may combine communicative channels in more complex ways than previously thought.

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Speech and Gesture Integration in Adolescents with High-Functioning Autism

Abstract for submission (characters maximum): Iconic gestures are ubiquitous and provide vital communicative information to the listener. Individuals with autism show a constellation of social and communicative impairments, yet it is unknown whether difficulties with iconic gesture comprehension contribute to the core features of autism. The purpose of this study was to examine iconic gesture comprehension in autism, and to assess whether cross-modal processing difficulties may impede gesture and speech integration in this population. Method: Participants were 19 adolescents with HFA (mean age:15.6 yrs) and 20 typical controls (mean age:15.23 yrs), matched on age, gender, VIQ, and SES. Iconic gesture comprehension was assessed through quantitative analyses of eye fixations during a video-based task. Participants watched videos of a woman describing one of four shapes shown on a computer screen. Half of the videos depicted natural speech+gesture combinations, while the other half depicted speech-only descriptions (with identical verbal information). Participants clicked on the shape that the speaker described. Since gesture typically precedes speech, we hypothesized that controls would visually fixate on the target shape earlier on speech+gesture trials compared to speech-only trials, indicating immediate integration across modalities. We further hypothesized that the autism group would not show this effect. Results: Analyses of eye movements revealed that controls identified the target more quickly when iconic gestures accompanied speech. Conversely, individuals with autism showed slowed comprehension when gestures were present compared to when speech occurred alone. This effect was not accounted for by unimodal processing difficulties. Conclusions: These findings suggest that individuals with autism have cross-modal processing difficulties that significantly hinder gesture and speech comprehension. They also implicate the STS, a brain region responsible for social cognition and biological motion perception.

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1:30-3:30 Parallel sessions

Session 12A: CATCHMENT, COGNITION & DISCOURSE (Concert Hall)

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Another Face Of Catchment: Does It Have Any Impact On What We Talk About?

When asked to retell a cartoon story (*Canary Row*), most narrators avoid mentioning a particular piece of information in the story. We found that narrators avoid mentioning it probably because by referring to it they would collapse the catchment, which is the recurrence of one or more gesture features in discourse and is useful for reference maintenance because of the recurrent features that suggest a common discourse theme.

The avoided information in question is the direction in which the cat, the protagonist, escapes from the old woman in the punch line of the fifth scene. Up to that point, all of the scenes end with the cat being thrown out from the left to the right of the screen (The vertical dimension is ignored here). In the fifth scene, the cat escapes from the right to the left, deviating from the consistent pattern that had been established by then. The irregular pattern could possibly call for special attention as new information, but the piece of information is actually often dropped from the narrative. We explain the phenomenon in terms of catchment, which in many narrations of this particular story materializes as the default positions of the cartoon characters, direction of movement, etc., and is used to maintain references. If the narrator collapses the catchment by mentioning the deviant spatial pattern to be precise, he or she would not be able to use the catchment for reference maintenance again. Thus, for many speakers, the priority was on easy reference maintenance by keeping the catchment intact. This also explains why many speakers mention the deviant spatial pattern in the final scene, because the narrator no longer has to maintain a reference after talking about the final scene. The phenomenon suggests that the catchment not only serves to achieve cohesiveness in discourse (e.g., reference maintenance), but also may constrain the selection of information to talk about.

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Gestural Effects on Working Memory and Attention

Goldin-Meadow et al. (2001) found that people who gesture while speaking perform better at a separate memorization task. Current models of Working Memory (WM) and Attention (Miyake & Shah 1999, Pashler 1997) can help explain those findings: the externality of gestures and their longevity may take advantage of our orienting response and exogenous attention, reducing the need for internal rehearsal in WM and easing the central processing bottleneck inherent in voluntarily directed (endogenous) attention.

I propose that recurring gestural elements (e.g. "catchments", McNeill 2000) can qualify, within Nelson & Goodmon's (2003) WM model, as "recall cues": elements that "re-enact the encoding context". Held gestures can also function as extended recall cues, by *maintaining* the contextualizing scope instead of re-enacting it. By virtue of being held over from an earlier moment, a held gesture may especially benefit a speaker or addressee if it provides a temporal bridge across a moment of sudden distraction, acting as a recall cue to the earlier content and thus overcoming the effects of the distraction.

The present experiment focuses on the addressee: participants were presented with video clips of a person describing a scenario, followed by a True-False question. Each video contained a disruption which temporarily eliminated visual access to the speaker and replaced it with a highly distracting bouncing object. In three separate blocks of participants, the speaker's performance featured (1) held gestures lasting beyond the disruption, (2) held gestures visible only before the disruption, and (3) no held gestures. As predicted, those with renewed access to the held gestures (which lasted beyond the disruptions) responded significantly faster than those who saw the

gestures only before the disruptions. Surprisingly, however, those who saw no gestures at all *also* responded faster, by roughly the same amount. The stark implications of these results are discussed.

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Making The Object Real – Or How "Gesturing-For-Discourse" Is Accomplished

As the importance of gesturing in, throughout and for acquisitional processes related to (2L1, early L2, L2) language-s is acknowledged (e.g., Gullberg 2003; Mayberry/Nicoladis 2000), the question as to how learners move into, build and rely onto 'gesturing-for-discourse' remains still an open question, especially with regard to joint processes of configuring discourse objects/topics (Gullberg 2005). In fact, studies investigating gesturing linked with discourse cohesion in learner's (individual) talk, often lack to take into account the sequentially accomplished and jointly shaped nature of topic configuration in discourse. However, recent analyses concerned with features of definiteness marking in early (age 6-8, French) (Ziegler 2006) and subsequent (age 12-14, French) L2 development show participants' work on shared and mutually relevant topic configuration by sequentially related gesturing beyond iconic, symbolic or co-verbal anchoring of the topic at stake (e.g., change of topic; disambiguation of topic; topic development (such as form of item to meaning of item in the actually accomplished L2 work etc.)). Rather, gesturing-for-discourse in L2 peer-interactions seems to follow trajectories of bringing the relevant discourse object to front, in terms of "added realism" (Sweetser 2000) gained from jointly accomplished topic movement in gesturing. Observations stemming from detailed sequential analyses of two comparable (video/audio taped) sequences allow for conclusions concerning a) the nature of L2 development as discourse-in-interaction and, more importantly, b) the essential quality of gesturing in joint topic accomplishment.

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Session 12B: INTERACTION (Rehearsal Room)

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Illustrating Second Language Through Gestures:
A Definition And A Methodology For Teaching Gestures

In the second language (SL) classroom, there is a clear linguistic asymmetry between a teacher who has a good command of the foreign language and learners (especially beginners) who hardly understand it. Therefore, if the teacher wants to avoid translating, he/she needs to provide learners with extra/redundant information. Using gestures to illustrate speech and thus enable the L2 learners to understand it, is a possibility many teachers choose. One can wonder whether or not a teaching gesture (TG) is similar to a co-speech gesture. It is, in many ways, and can be analysed as such. But it has to be more iconic and unambiguous so that it is understood easily. The representation of a notion by a TG relies on prototypical (or salient) features in order to reach the mental representation the learner has acquired of this particular notion. TGs also differ from co-speech gestures which are usually "spontaneous creations of individual speaker, unique and personal" (McNeill, 1992:1) because they are most of the time produced consciously by teachers. When a TG is used on a regular basis and always conveys the same meaning, it becomes a conventional code (McNeill, 1992) shared by the teacher and the learners. Teachers and programs of teachersí training often stress the impact of TGs on the understanding and the memorising of the SL but there are very few empirical studies to assess its effect. My study combines the issues of second language acquisition (SLA) with a methodology taken from cognitive psychology and gesture studies. A great part of my work has been dedicated to the elaboration of an experimental methodology to assess the impact of TGs in SLA by 5 year-old children. To analyse how gestures are used by children in order to understand the SL, I have set up experiments in which French children were exposed to a story in English (an unknown language to them) and had to rely on the multimodal clues provided with the story to understand it. Following interviews enabled me to explore how children infer meaning from various modalities, especially gestures. To analyse the impact of TGs on

memorisation, I have used previous studies on this issue (Cohen and Otterbein, 1992; Quinn Allen, 1995; Feyreisen, 1998) and have transposed them to my young subjects. According to my data, seeing and especially reproducing gestures do significantly improve short and long term memorisation of lexical items in both first and second language.   This communication aims to explain what a teaching gesture is and how we can analyse its effects on SLA.

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Some Initial Findings From South Africa On Physical And Interactive Aspects Of Gestural Acquisition In Children

Using elicitation and video recordings of spontaneous gestural behaviour and elicitation among children in natural contexts of use, I examine the acquisition of two common quotable gestures/emblems, the "thumbs-up" gesture and the "clever" gesture. Both gestures play a significant role in every day interactions among South Africans. Data have been drawn from video footage of children from the ages of 4 months to 6 years in and around their homes and at day care centres in one urban township community outside Johannesburg. Adults begin using the "thumbs up" gesture with infants from as young as 4 months of age as a greeting and as a marker of friendship and inclusion. From as early as six months, infants initially used the forefinger to perform the "thumbs up" gesture. Transition from forefinger to thumb occurred from 18 to 24 months. A recent change by adults in the use of the "thumbs up" gesture has, however, resulted in infants appearing to use the correct form of the "thumbs-up" from as early as nine months. Children produce the "clever" gesture from as young as three years of age, but are unable to produce the correct form until 4 and 5 years of age. Children's communicative use of these gestures is also compared with that of adults. Questions related to the impact of physical development and coordination of the hand on gestural production and the influence of environmental, social, and interactive factors on gestural acquisition and use in children are discussed.

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Giving Them a Hand: Gesture and the Manual Lexicon in Deaf Children

In this work, I investigate how parents' speech-accompanying gesture influences deaf children's development of a manual lexicon when they have incomplete access to a conventional language. In particular, I look at how hearing adults use gesture in interaction with orally educated deaf children in order to illuminate how parents' gestures serve as identifiable lexical items that the children can subsequently incorporate into their emergent manual systems. Specifically, I focus on how the manual modality shapes the discursive activities of four families of orally educated deaf children with cochlear implants in Castilian speaking regions of Spain. Due to the children's incomplete access to a conventional language model, they rely heavily on gestures in order to communicate with their hearing families as they transition from deafness to hearing. I therefore use the children's communicative activities in their manual systems as a recursive tool for analyzing the speech-accompanying gestures that parents use when engaging their deaf children in co-constructed discourse. This allows me to identify nonverbally encoded meanings in hearing parents' linguistic performance that inform the deaf children's manual lexicon. I therefore argue that because the parents' linguistic performance is both spoken and embodied, or multi-modal, identifiable meanings are available in gesture that the deaf children access and incorporate into their manual systems. By extension, then, all children, hearing or deaf, may be learning from, and taking advantage of, multiply encoded meanings (that is, meanings conveyed in both speech and gesture) as they enter into a community's meaning systems.

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Contexts For Parallel Gesturing In Adult Child Conversation

Recent studies show conversational participants paying attention to each other's gestures as well as speech and in this way demonstrate an aspect of the role of gesture in the communicative process. This is especially clear when one participant carries out a gesture that repeats, at least partially, a gesture of an other. Such "parallel gesturing", of which "gestural mimicry"(Kimbara 2006) is one form, shows that a participant's expression has been directly affected by the other's gesture (de Fornel 1992, Tabensky 2001, Cristilli, In Press). Here we describe examples of "parallel gesturing" in 10 five minute adult-child conversations, involving children between 3 and 9 years. 19 cases of "parallel gesturing" were noted. Contexts of occurrence include: (1) Adult or child repeats both spoken and gestural components of the other's utterance to display understanding of the other. (2) Adult repeats, often with some modification, the child's gesture in re-elaborating or re-stating the child's utterance as a way of offering the child a more complete or correct expression. (3) Adult repeats the child's gesture as a way of entering into the same expressive style as the child. (4) Either adult or child parallels the other's gesture when an expression of similar discourse type is reciprocated. The observations presented (a) provide evidence that young children as well as adults can pay close attention to each other's gestures, as well as to words; (b) show that where an expression is repeated this can involve the entire gesture-speech ensemble, thus confirming the integrity of this ensemble (Kendon 2004); (c) often show differences in the mode of performance of the gesture in question by the child in contrast to that of the adult.

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Session 12C: CHILD GESTURE (Recital Hall)
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Gesture Precedes Sign: The Role Of Motoric Vs. Cognitive Ease

Previous research suggests that gesture eases children into certain aspects of language development (Iverson et al., 1994; Ozcaliskan & Goldin-Meadow, 2005). These include gesture preceding first words, and gesture + word combinations preceding word + word combinations. The role of gesture has been characterized as supporting the childís ability to produce a cognitively more complex utterance. Two alternative explanations exist for this phenomenon: first, gesture is motorically easier to produce, and second, gesture is easier because it uses fewer cognitive resources than language. These will be evaluated through the analysis of the types of combinations that children acquiring American Sign Language (ASL) produce in their early signing. If the first explanation is correct, then signing children should produce gesture + sign and sign + sign combinations on the same timetable. In contrast, if the second is correct, then signing children should produce gesture + sign combinations in advance of sign + sign combinations. Two hearing children (one boy, one girl) of Deaf parents were filmed for approximately one hour, bimonthly between the ages of 6 months and 2 years. All of their hand movements were been coded. Both children showed the following sequence of development: first, strings of babble, gesture and pointing were the dominant combinations (1;0-1;4); second, a period of point + sign and some gesture + sign combinations (1;5-1;9) occurred, few sign + sign combinations appeared; and third, larger numbers of sign + sign combinations appeared after 1;10. [Submission box would not accept graph.] These results differ from those of Capirci et al. (2002). These data support the second alternative, that children produce gestures because they are cognitively easier, not because the manual modality is easier. These results indicate that gesture does rely on distinct thought process from early speech, and supports claims that the use of gesture can facilitate childrenís mastery of symbolic and linguistic forms.

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Motoric Characteristic Of Depictive Gestures Produced By Young Children

This study explores depictive gestures produced spontaneously by hearing children when requested to label pictures representing actions or objects. Eighty seven children (age range between 24 and 37) participated in the study. The database consists of a total of 269 depictive gestures produced with (80%) and without speech (20%). The gestures produced in response to five pictures depicting objects (comb, glass, gloves, lion, umbrella) and to five pictures depicting actions (to open, to turn, to swim, to wash hands, to telephone) were chosen for a more detailed analysis. The range of gestures produced for each of these items varied from 3 to 27 for a total of 128 gestures. The gestures have been analyzed according to the same parameters used to analyze the signs produced by deaf children exposed to Sign Language: hand configuration, place of articulation and movement (type and direction). Similarities and differences in the form of gestures produced by the individual children referring to the same picture are explored and discussed. Our results show that many motor constraints found in the production of first signs, as reported in the Sign Language acquisition literature, also apply to depictive gestures produced (with or without speech) by hearing toddlers. These findings support the view of a continuum between gestures and signs instead of a clear cut separation.

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The Emergence Of Complex Pointing Patterns

When mothers explain a spatial relation to their children, they point not only to the participating objects but seem to draw a trajectory according to which the objects should be put together. Similarly, when pointing to a canonical relation, mothers seemed to point in form of a saccade from the trajector to the landmark object. These observations suggest that pointing can fulfill both deictic and iconic functions, supporting the view that the gesture types often proposed in literature are not disjunctive. However, an alternative is that such patterns emerge because of tight timing of two, closely sequenced gestures. For example, the observed saccade might come about when performing fast, alternate pointing to two participants. Similarly, a pointing trajectory could emerge because the speaker starts with a deictic gesture, isolating the location of a referent, and then focuses on related, yet different information reflected in arising iconic gesture features. Thus, instead of loading single gestures with deictic and iconic information, complex pointing patterns are hypothesized to emerge from distinct gestures that convey meanings so tightly related that the movements are triggered either closely one after the other or in overlap. In result, co-articulation effects due to biological constraints of the motor system as well as the timing of this form of incremental gesture thinking may have significant impact on the resulting gesture pattern. This performance may, in turn, be perceived and interpreted by the observer as complex of different forms of information. We tested this hypothesis by analyzing empirical data on pointing in mother-child dialogues. In addition, we simulated the emergence of pointing patterns using the virtual human MAX, whose motor control model is able to blend independent, arbitrarily timed gestures.

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Types And Frequency Of Actions And Gestures In Children From 8 And 17 Months

The present study focuses on actions and gestures produced by infants in the second year of life. Data were collected through the questionnaire "Il Primo Vocabolario del Bambino—PVB" (Caselli & Casadio, 1995), the Italian version of the Mac Arthur Bates Communicative Development Inventory (Fenson et al., 1993). This instrument is widely used to investigate language development in children; but little research has examined the action and gesture repertoire across different ages and cultures. For the present study we consider data on 500 infants from 8 to 17 months, collected through the "Word and Gestureî Form. This consists of a 408-item vocabulary checklist (spoken comprehension and production) and a 63-item Actions/Gestures checklist, organized into five subscales: "First communicative gestures" (deictic and conventionalized communicative gestures- e.g., POINTING, BYE-BYE); "Games and Routines": (early social/interactive behaviours, e.g. PEEKABOO); "Actions with objects" (e.g. COMB OWN HAIR); "Imitating other adult actions" (e.g. PUT KEY IN DOOR); "Pretending to be a parent" (performing actions with a puppet, e.g. COMB DOLL); "Pretending play with objects" (emergence of pretend substitutions during play). We report and discuss the mean age at which each item on the Actions/Gestures checklist appeared in the repertoire of at least 50% of the children. The relationship between action/gesture production and word comprehension and production is also discussed. A clear progression from deictic gestures and social routines to pretend play, trough conventionalised and representative actions/gestures emerged. Moreover, the data demonstrate a strong correlation between lexical repertoire and non-verbal abilities. The results are compared with those available on English-speaking children (Fenson et al. 1994) and discussed to highlight the link between motor system, cognition and language (Rizzolatti & Craighero, 2004; Bates & Dick, 2002).

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Session 12D: PANEL: COMMON GROUND (Fiske Hall B01)

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Mechanisms by Which Gestures Contribute to Establishing Common Ground:
Evidence from Teaching and Learning

The papers in this thematic session explore gesture's role in establishing shared frames of reference. They each delineate different mechanisms by which spontaneous gestures contribute to establishing common ground in instructional settings. In the first paper, Robert Williams identifies two classes of gestures that contribute to common ground by lending physical presence to conceptual content: mapping gestures, which link conceptual entities to environmental structures or locations, and anchoring gestures, which create conceptual associations with the gesturer's own body. Mitchell Nathan and Martha Alibali identify gestures that link related conceptual ideas in a classroom lesson about mathematical equations. They also identify sets of repeated gestures, or catchments, that serve to highlight conceptual connections. Chris Rasmussen, Michelle Stephan and Karen Allen identify a set of gestures that are used across multiple class periods as students learn about differential equations. This set of gestures is related by a "chain of signification." Noel Enyedy and Viviana Castellon focus on students' use of gesture to resolve "trouble spots" in communication about mathematical problem solving, in an instructional setting that involves adult English language learners receiving high school degrees. Gesture use enabled intersubjectivity among interlocutors without use of academic English or restrictions of linguistic content registers. Taken together, the papers highlight the integral role of gesture as a means of establishing intersubjectivity in instructional settings.

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Using Gestures to Establish Common Ground

Do gestures communicate? Framing the question like this tends to evoke the conduit metaphor of communication, e.g.: Do beat gestures convey prosodic emphasis? Do depictive gestures convey visual aspects of scenes or metaphoric source domains? Do emblematic gestures, like lexical items, convey conventional symbolic meanings? Unfortunately, the conduit metaphor blinds us to another potentially significant function of gesture in human communication: establishing common ground. Intersubjectivity is achieved when participants share a definition of the situation, i.e., when they conceptualize it in compatible ways. In my studies of the gestures teachers make during instruction, I find two related ways that gestures contribute to common ground by giving conceptual content a physical presence: 1. "Mapping gestures" link conceptual entities to environmental structures or locations that sustain these elements and their relations in the ensuing discourse. 2. "Anchoring gestures" act as proxies or surrogates for conceptual entities, mapping conceptual content to the gesturer's own body. These grounding functions become apparent when we analyze how talk and gesture prompt for mental space building, cross-space mapping, and conceptual blending. Examples will illustrate the role of gesture in constructing both single-scope conceptual blends (based on one conceptual model) and double-scope blends (combining two or more conceptual models) in the shared physical space of the discourse. Once conceptual entities have been anchored, they can be directly referenced and manipulated to generate inferences. Mapping gestures and anchoring gestures thus produce conjoined conceptual-physical referents that participants can use to test their intersubjective understandings while they jointly accomplish cognitive work.

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Giving A Hand To The Mind: Gesture Enables Intersubjectivity In Classrooms

Communication is an effort to ground meaning in both the cognitive and social realms (Clark, 1996). To enable common ground, or intersubjectivity, one needs to delineate common referents. In this paper, we consider how teachers and learners establish common ground in instructional settings. One situation in which establishing common ground is particularly important and challenging is when teachers introduce new representations or systems of notation. How do learners begin to attribute meaning to such representations? How do the teacher and student enable common ground in such a setting? One approach is by establishing mappings between a familiar

representation and the less familiar target representation.   This purpose of this paper is to explore how gesture contributes to making mappings between familiar and novel representations. We present an extended analysis of a beginning algebra lesson in which a teacher introduces a new way of using equations to model situations. The lesson focuses on the relationships between a familiar equation used to derive a solution ((42 - 18) / 4 = n), and a target equation used to formally model the original problem situation (4 x n + 18 = 42). The teacher's actions illustrate some of the ways that abstract representations can be made meaningful to learners through physically enacted structural mapping that sets up analogical relations between the two representations. We identify two main mechanisms that involve gesture for establishing this mapping. First, linking gestures are sets of attention-guiding gestures that delineate correspondences between the familiar and new representations. Second, gestural catchments use repeated features, such as recurrent hand shapes, to convey similarity and to highlight conceptual connections across the two equations. This analysis suggests a new view of instruction as communication and underscores the central role of gesture for enabling common ground during instructional communication.

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Gestures as a Chain of Signification: The Case of Equilibrium Solutions

In this paper we examine the unfolding and growing complexities of student-teacher gestures as they relate to how a community of learners engage the notion of equilibrium solution, a central idea in first order differential equations. The analysis offers an analytic account of how, over an extended number of class sessions, gestures can form a series of related signs. We frame these related signs in terms of a chain of signification. To the best of our knowledge, this is the first analysis of gestures in terms of a chain of signification. We view gestures as part of the talk and use of inscriptions that are produced through interaction and the meaningful pursuit of mathematical goals.   Recent advances in cognitive science point to the view that learning is inseparable from oneís physical being. This theoretical commitment has, in part, fueled interest in gestures and consideration of how gestures relate to learning and discourse. Two primary theoretical positions have been developed to describe the relationship between gestures and discourse. One position is that gestures are simply extensions of language that convey nothing different than words. A second position, and the one that informs our work, views gestures and language as inseparable, with both having semantic value and arising together in the process of thinking and communicating.   An important connection to this second position is that knowing engages multiple modalities, including talk and use of inscriptions and tools. The work on embodied cognition suggests we also include gesturing in the forms of activity that constitute thinking. Thus, we view learning as distributed not only across talk, use of tools and inscriptions, but also across gesturing activity. We argue that communicating is thinking and not simply the external expression of thought. Thinking then, is not something that occurs solely in the mind, but also in the ways in which one communicates.

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Gesture's Role In The Semiotic Ecology Of English Learners Solving Math Problems

As educational researchers our primary focus is on engaging youth in productive disciplinary conversations: conversations that lead to conceptual understanding. In our presentation we will focus on conversational resources that contribute to effective interactions for students whose first language is not English. English Language Learners (ELLs), who often find themselves in classrooms dominated by English, are challenged to

learn the academic content (in our case mathematics) and English simultaneously. Without a shared vocabulary, and because of the register confusion between everyday English, everyday Spanish, and the mathematical registers in both languages, gesture is a resource that can produce a common ground between the speaker and listener.   Our study examines 4 dyads of bilingual adults, between the ages of 18 and 25, who are attending a charter high school in East Los Angeles, California. Students were videotaped as they engaged in mathematics problems related to construction work. Our analysis focuses on points during problem solving where the students encounter either a conceptual problem or a communicative problem. Using methods from conversational analysis (Goodwin, 2003), we investigate the coordination of semiotic resources--and in particular gesture--that were used to a) achieve intersubjectivity about the nature of the problem and b) resolve the difficulty. Findings reveal a complex semiotic ecology where speech and gesture indexed and reinforced one another, but where students also opportunistically used their physical environment and body orientation to clarify the intended meaning of other resources such as their gestures.

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4:00-5:30 Parallel sessions

Session 13A: PANEL: GESTURE IN DIALOG (Concert Hall)

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Dialogue Elicits Demonstration (Icons): Evidence From Gestures, Faces, And Words
Our ongoing program of experimental research is currently uncovering a surprising relationship between dialogue and demonstration. Participants in dialogue (vs. monologue) are significantly more likely to include icons or images of the referent rather than (or in combination with) a verbal description using traditional linguistic symbols. The accumulating results so far show that hand and facial gestures and two verbal forms of demonstration are strongly linked to dialogue and are suppressed in monologue (i.e., where there is no addressee). This effect of the presence of an addressee is consistent with Peirce's proposal that icons involve the "calling up of an image" (in Hartshorne & Weiss, 1960, p. 360). That is, speakers do not need to evoke an image for their own understanding; rather they are presumably calling up an image in the addressee. Our results also fit Clark and Gerrig's (1990) reframing of icons as demonstrations and provide some support for their proposal that "the point of demonstrating a thing is to enable addressees to experience selective parts of what it would be like to perceive the thing directly" (Clark, 1996, p. 174). That is, if there is no addressee, there would be no point in demonstrating. We present four lines of evidence for a close link between dialogue and demonstration: Bavelas, Gerwing, Sutton, & Prevost (in press) have shown that dialogue itself has a strong effect on the rate of hand gestures, an effect recently replicated in another experiment. In addition, our current research has shown that the rate of speakers' facial gestures increases in dialogue, which complements Chovils (1991) finding for listeners' facial displays. Moreover, these data sets also reveal dialogue effects on verbal demonstrations, namely, direct quotation and figurative speech, which are virtually absent when there is no addressee. We propose that the traditional "verbal vs. nonverbal" distinction may be less useful than a more abstract distinction based on modality, that is, description vs. demonstration. Language use in face-to-face dialogue is an integrated combination of these modalities, whereas without an addressee, speakers restrict themselves mainly to verbal description.

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Hand Gestures

Our experimental evaluation of the effect of dialogue on hand gestures (Bavelas, Gerwing, Sutton, & Prevost, 2006) has shown that dialogue itself has a strong effect on the rate of gesturing. The three experimental conditions were a face-to-face dialogue (FTF), a dialogue on the phone (PH), or a monologue to a tape recorder, without an addressee (TR). This design makes it possible to separate the effects of dialogue (FTF and PH vs. TR) from the effects of visibility (FTF vs. PH and TR). The results showed that the primary determinant of the rate of gesturing was whether the speaker was in a dialogue or not. The rate in both of the dialogue conditions (whether face-to-face or on the telephone) was significantly higher than in the tape-recorder condition. That is, even when the speakers on the telephone could not see their addressee, they gestured at a higher rate than those with no addressee. Indeed, even though the rate was highest in the FTF condition, it was not significantly different than the telephone dialogue, suggesting that dialogue itself has a strong effect in raising the rate of gesturing. We also noted that previous experiments using confederates or highly restricted dialogues have had a different pattern of results than those that permit full dialogues. One implication is that studies of gesturing by individuals who are not in a true dialogue may not be generalizable to the use of gestures in dialogue.

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Facial Gestures

Virtually all studies of the face have focused on facial expressions as an indicator of the individual's emotional state. However, in face-to-face dialogue, facial actions can function as displays to an addressee, conveying information that is directly related to the talk in progress, much as hand gestures do (Bavelas & Chovil, 1997, 2000, 2006). In the first controlled experiment on conversational facial displays, Chovil (1989, 1991) examined the facial displays of listeners who were hearing a speaker tell a personal close-call story in four conditions: face-to-face dialogue, telephone dialogue, dialogue through a partition, or listening to an answering machine (alone). The rate of facial displays was significantly higher when the interlocutors were in dialogue than monologue, even when the dialogue was on the telephone or through a partition. The faces of individuals listening to an answering machine (i.e., with no dialogue partner) were virtually inexpressive, even though the story they heard was at least as dramatic as the stories in the other conditions. Thus, there was a significant effect of dialogue itself, such that dialogue elicited listeners' facial displays while monologue suppressed them. We are currently examining the effect of dialogue on speakers' facial displays, using face-to-face, telephone, and tape recorder conditions.

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Figurative Language and Quotations

Some verbal actions are also demonstrations, specifically, metaphors (Peirce in Buchler, 1940, p. 105; Clark, 1996, p. 157) and direct quotations (Clark & Gerrig, 1990). We have shown that both of these are significantly higher in dialogue than in monologues. In the Bavelas et al. (2006) experiment described above (which compared face-to-face dialogues, telephone dialogues, and monologues to a tape recorder), the rate of figurative (metaphorical) language was also affected by dialogue. Speakers used figurative language at a significantly higher rate in the telephone dialogues than in the monologues to a tape recorder. That is, even though such verbal images were equally available to speakers in both conditions, the monologists used them much less frequently, presumably because there was no addressee in whom to "call up an image" (Peirce, 1960, p. 360). A more recent experiment using the same design has shown the same results for verbal quotations, the rate of which was higher in dialogues than in monologues. Speakers on the telephone used direct quotation significantly more often than those speaking in monologue to a tape recorder, where quotations were extremely rare. It is also worth noting that, in direct quotation, the speaker requires the addressee to recognize that these are not the speaker's words but someone else's, and in our data, the speakers used specific verbal and prosodic discourse markers to signal direct quotation for the addressee.

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Session 13B: LANGUAGE ACQUISITION (Rehearsal Room)

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Negation In American Home Sign Systems

Deaf children whose hearing losses are so severe that they cannot acquire spoken language and whose hearing parents have not exposed them to sign language develop gesture systems to communicate despite their lack of a language model. These gesture systems, known as home signs, have many of the properties of natural language. Previous work has shown that the home signs developed by American and Chinese deaf children possess syntactic or sentence-level structure as well as morphological or within-gesture structure (Goldin-Meadow & Mylander, 1998; Franklin & Goldin-Meadow, in progress). In this study, I further explore the language properties of home signs through an investigation of negation in an American deaf child's system. Side to side headshake as a negation marker is found in many sign languages including American Sign Language (Baker & Cokely, 1980; Liddell, 1980), British Sign Language (Lawson, 1983), Sign Language of the Netherlands (Coerts, 1992) and International Sign (Webb & Supalla, 1994). This paper presents the expression of negation in American home sign . Negation in hearing English speaking children follows a developmental trajectory in which the negative element occurs first at the edges of the kernel sentence before becoming internal to the sentence string (Bellugi, 1967; Bloom, 1970). The current project maps the developmental trajectory of negation in children not exposed to a conventional language model. Our results indicate a developmental step in the inclusion of a negative headshake to a gesture string. Further, the children in our sample produce negative elements initially external to their gesture strings with only a subset of the children producing string-internal negative headshakes. These results suggest the resilience of negation's developmental trajectory as well as its limitations. Negation may be initially produced externally by all children but may require a more advanced system (either provided or generated) to propel negative elements into a sentence. Additionally, negation meaning also changes over time from rejections and non-existence to denials. In order to determine whether these results can generalize to headshake use in the manual modality or whether these results reflect language creation within home signing systems, headshake use and patterning are explored in English speaking children.

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Building Similarity Mappings With And Without A Language Model

Similarity mapping ('a butterfly is like a rainbow') is one the earliest meta-linguistic abilities children master, serving as a precursor to more complex analogical and metaphorical mapping abilities (Gentner, 1988). To explore the role that linguistic input plays in the development of similarity mappings, we examined children who had no linguistic input--deaf children whose hearing losses prevented them from learning speech and whose hearing parents had not exposed them to sign. These children create gesture systems that have language-like structure. Our question was whether the deaf children's gesture systems contained similarity mappings. We observed four deaf children for 2 years, starting at ages 2;3, 2;10, 2;11, and 3;1. In addition, we examined videotapes of 40 English-learning hearing children followed for 2 years, starting at 1;2. We extracted all communicative acts that conveyed similarity mappings between objects and divided them into gesture-only combinations (POINT TO BUTTERFLY + POINT TO RAINBOW) and, for the hearing children, gesture-speech combinations ('butterfly' + POINT TO RAINBOW), and speech combinations ('butterfly is like a rainbow'). We found that all four deaf children used their gestures to make similarity mappings, suggesting that a language model is not essential for children to recognize similarities between objects and to communicate about those similarities. Moreover, we found striking parallels in the similarity mappings produced by the deaf and hearing children. Children in both groups based their similarity mappings on the same types of comparisons (general

appearance, color, shape) and the same kinds of objects (animal, people, food, body parts). The hearing children also exploited gesture, using it to help them produce similarity mappings before they acquired the requisite linguistic tools. The findings underscore the robustness of similarity mappings in human communication and gestureís flexibility as a communicative tool.

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How Children Learn About Dutch Placement: The Role Of Verb Meanings

Little is known about what drives children's development towards adult-like gesturing. This study explores whether children's gestures are mediated by their understanding of verb meanings, targeting the domain of placement, e.g. putting a cup on a table. Although gestures could neutrally depict placement as an imitation of the functional manual action, adult gesture use appears to be mediated by verb semantics leading to language-specific gesturing. For example, French speakers use a general placement verb mettre "put" and typically encode only path in their placement gestures. Adult Dutch speakers use one of two obligatory placement verbs encoding caused posture; zetten, "set/stand", for vertically placed, and leggen, "lay", for horizontally placed objects. Their gestures typically incorporate objects in handshapes, reflecting the object-focus needed for appropriate verb selection (Gullberg, forthc.). Drawing on elicited event descriptions this study examines how Dutch four- (N=9) and five-year-olds (N=6) talk and gesture about placement compared to adults (N=6). The results show that children do not imitate actions and also differ from adults. Four-year-olds produce path gestures only whereas five-year-olds are more adult-like and also produce figure-incorporating gestures. Interestingly, the gesture differences match differences in verb usage in speech. Children who produce only path gestures also over-use leggen 'lay' applying it to all events, even to vertically placed objects. Conversely, children who produce figure-incorporating gestures also distinguish the verbs and use zetten 'set' correctly for vertical items. We argue that children's gestures reflect their current knowledge of verb semantics with a focus either on motion or on object-based distinctions. These findings lend support to the notion that learning to gesture in an adult-like, language-specific way is partly related to learning the semantic distinctions of your language.

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Session 13C: APHASIA (Recital Hall)

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The Importance Of Establishing Recipiency Prior Initiating Gesture In Aphasic Talk-In Interaction

Language is seen to be the most familiar instrument at our disposal to communicate with one another. Other semiotic resources such as non- verbal behaviour, gesture, gaze, positioning in space, and intonation are also available to us and permit us to construct meaning in our everyday interaction. In normal conversation, gesture often co-occurs with talk; in normal conversation, the hearer may entirely ignore the gesture and just rely on the talk in order to make an understanding of the sentence (McNeill, 1992). Loss or impairment of speech is a major handicap in everyday life. Aphasics have their lexical ability limited, which reduces their resources and their interactional activities. Nevertheless, they use resources around them to compensate for their lexical limitation. Gesture in aphasia is a powerful communicative tool, which enables aphasics to remain active interactants. An utterance by an aphasic may be done through gesture only because of his/her lexical limitations (Goodwin, 2000). The data are drawn from a corpus of 40 hours of videotaped interaction that include JS, SW and NM, who suffer from expressive aphasia (Broca), and their non-aphasic co-participant(s). The interactions were filmed within the context of the residential homes or nursing homes of the aphasic participants. The data were transcribed and analyzed following a conversation analysis approach (Sacks, Schegloff, & Jefferson, 1974). This paper presents video clips and their analysis, which identified a systematic mechanism, which enable the aphasic to make their

gesture conversationally relevant: establishing recipiency (elicitation for visual availability from the aphasic and display through gaze or body orientation of the co-participant). Implications, which involves aphasic co-participants, surrounding environment and rehabilitation are also discussed.

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Diversity Of Hand Gestures In Patients With Aphasia And Limb Apraxia

In treatment of language disorders, several approaches make use of gestures as compensatory strategy or for facilitating word retrieval. However, the prerequisites for a successfull therapy remain unclear. Especially the relationship between limb apraxia and the ability to produce gestures in spontaneous daily conversation is not yet well understood. Research in this field has led to contradictory outcomes. While results of some studies (e.g. Borod 1989) suggested an influence of limb apraxia on spontaneous gesturing in conversation, more recent data provide evidence for a dissociation (Lausberg 2000). In the present study we investigated the impact of limb apraxia on spontaneous gesturing in severe aphasic patients. Concerning limb apraxia assessment, we were mainly interested in the ability to produce meaningful gestures to command (pantomime of object use) because it is the aspect of apraxia most likely to be related to spontaneous gesturing. We present data of twenty patients suffering from severe aphasia. Eleven patients display concomitant limb apraxia. Video recordings were obtained in a semi-spontaneous situation where patients were required to retell short video clips. Hand gestures were transcribed with a modified version of a notation system which was originally developed for sign languages. The hamming distance, a measure derived from information- and coding theory was used to quantify the diversity and hence the potential informational richness of the gestures. Data analysis revealed a significant correlation between scores obtained in limb apraxia assessment and hamming distances. However, this correlation was based on the data of a single patient only. A comparison of hamming distances of the patients with and without apraxia showed no significant differences. Our results indicate that the presence of limb apraxia does not allow to draw conclusions about a patient's ability to produce diverse gestures in communication.

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Links between Language, Gesture, and Motor skill:
A Longitudinal Study of Communication Recovery in Adults with Broca's Aphasia

Although descriptions of communication ability in adults with Broca's aphasia include language deficits and motor apraxia that affect gesture production, it is not known to what extent communication patterns change over time. In this study, a group of six adult men with post-stroke Broca's aphasia and a matched group of men with no neurological illness (NNI) completed an object description task in speech plus gesture, speech only, and gesture only conditions. Participants with aphasia were seen at monthly intervals for 6 months beginning at 1-2 months post-onset, and the *Western Aphasia Battery (WAB)* was administered at Times 1 and 6.
Participants with aphasia demonstrated significant improvement in language over the 6-month period. However, their speech was still significantly poorer that that of the NNI group; and their communication patterns differed from those of the NNI group in a number of ways. Gesture rate was significantly higher in early recovery than that for NNI adults. The majority of gestures produced by participants with aphasia were emblems, while the NNI group primarily made use of iconics. Relative to the NNI group, participants with aphasia in early recovery produced a significantly higher proportion of communications in gesture only. Participants with aphasia produced significantly fewer numbers of meaningful motor movements in pantomime gesture in early recovery. Substantial

individual variability was apparent within the aphasia group, with higher rate of gesture at Time 1 negatively associated with Time 6 *WAB* score and Time 6 MLU.

These findings are suggestive of re-organization in language and gesture during the 6-month recovery period following cerebrovascular accident. They are discussed in terms of the integrated nature of processes underlying speech and gesture and potential clinical implications of gesture use as an index of language recovery in Broca's aphasia.

AUTHOR INDEX