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METAPHOR AND METONYMY IN LANGUAGE AND GESTURE:
DISCOURSE EVIDENCE FOR MULTIMODAL MODELS OF GRAMMAR

A Dissertation

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

by

Irene Mittelberg

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BIOGRAPHICAL SKETCH

Irene Mittelberg was born in Bremen, Germany. She studied Romance linguistics and economics at the University of Freiburg and earned a Master's degree in French linguistics and art history at the University of Hamburg in Germany. Irene spent one year in France teaching German literature to high school students and studying French language and culture at the Sorbonne, Paris IV. She then entered the graduate program in Linguistics at Cornell University and received a Ph.D. in Linguistics with a minor in Cognitive Studies.

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INTRODUCTION



Figure 1: Greek Vase, 5th century B.C. (Müller 1998: 40)

1. General introductory remarks

Nos premiers maîtres de philosophie sont nos pieds, nos mains, nos yeux.

[Our first teachers of philosophy are our feet, our hands, our eyes.]

J.-J. Rousseau (Guérin 1995: 1)

Describing, reasoning and theorizing about grammar are central to the activities of every linguist, language teacher, and, to a certain extent, of any speaker who engages in some sort of meta-linguistic discourse. The question that motivates this dissertation concerns the ways in which speakers spontaneously exploit multimodal resources to make abstract grammatical

concepts and structures more graspable for their addressees. Of central interest here is the use of the human body, in particular, representational, co-speech gestures in the mediation of knowledge. Given that figurative language is assumed to be key in accessing and concretizing abstract domains, one of the underlying assumptions is that metaphoric and metonymic modes are at the heart of meaning-making processes in both the linguistic and the gestural modalities.

Conceptualizations of linguistic form and function have been a central issue in cognitive linguistics since its beginnings. However, there exists to date no empirical, discourse-based study of the ways in which grammatical categories and syntactic structures receive metaphorical structuring and contextual grounding. Taking a usage-based, multimodal approach, this study critically evaluates the assumption that visual modalities can provide additional evidence for fundamental claims made in cognitive semantics and especially in metaphor theory (Johnson 1987; Lakoff 1993, 1987; Lakoff & Johnson 1980, 1999; Reddy 1979; Sweetser 1987, 1990; Taub 2001). It asks how exactly speech and gesture share the communicative work of conveying embodied models of grammar: morphemes, words, phrases, sentences, semantic roles, syntactic functions and operations, and linguistic theories.

This work is part of the growing field of gesture research, whose findings show that spontaneous communicative gesture, which is inseparable from human interaction and social space, is a rich source for insights into the socio-cultural situatedness of both cognition and communication. The corpus built for this study consists of authentic academic discourse and co-speech

gestures produced by four linguistics professors (all native speakers of American English) who were videotaped during introductory linguistics courses at two major American universities.

The approach to multimodal communication taken here combines contemporary cognitive-functional theories of metaphor and metonymy with older but still relevant semiotic frameworks (Jakobson; Peirce). I argue that form and function of dynamic gestural signs are, in part, motivated by embodied experiences of concrete object manipulation, social interaction, and conceptual metaphor and metonymy. While Peirce's theory is claimed by contemporary gesture theorists to serve as the basis of the dominant gesture theories, I investigate in detail to what extent the commonly used gesture categories (iconics, deictics, beats, metaphorics, emblems; according to McNeill 1992) correspond to the different levels of Peirce's pragmaticist taxonomy. Besides responding to theoretical interests, this endeavor was primarily motivated by the assumption that some of the not widely-used sub-categories put forward by Peirce (e.g., diagrammatic iconicity; abduction as a principal mode of inference) are capable of capturing fine distinctions regarding the different types of relations between gestural signs and denoted concepts and also concerning the structural relations holding among single entities. Another pillar on which this work rests is Jakobson's balanced theory of metaphor (similarity) and metonymy (contiguity) as the two major modes of association and signification. Accordingly, an interpretative framework was developed that accounts for different types of iconicity, metaphor, and metonymy, as well as the interaction between them.

One of the main goals of this dissertation is to offer insights into the ways in which all of these principles and practices seem to structure multimodal messages, with the structural and material properties of each medium determining the cross-modal distribution of semantic features and pragmatic functions. It aims at contributing to a fuller understanding of the cognitive, linguistic, corporal, and socio-cultural dimensions of knowledge mediation in linguistics classrooms. One of the guiding motivations is the idea that empirical investigations into the logic and use of multimodal resources contribute to an ecologically-grounded understanding of social/embodied cognition, semiotic acts in teaching contexts, and the emergence of meaning in interpretive processes.

2. Multimodality, cognition, and context: Preliminary considerations

2.1 The nature of the gestural sign: Initial characterization of a corporal medium

Since visual signs possess their own specific materiality, unfold through spatial projection and are internalized through the sense of vision, we can assume that gestural images, articulated with hands and arms ("images gestuelles," Saussure quoted by Bouvet (1997:7)), leave different imprints upon the human mind than auditory signs do. Then again, if we compare gestural signs to solid sculptures or pictorial signs, captured on a piece of paper or a canvas, we realize that co-speech gestures are comparably fluid figures.¹ Hand shapes and movements vanish as quickly as they are produced

¹ Müller (1998) describes in what way hands still draw, sculpture, etc. when they gesture.

just as speech does. As the articulators in the speaker's mouth constantly form new constellations to produce sounds, hands, when in use, may also continuously change their shapes and motions. Even though a gesture might be held for a couple of seconds in a given situation, such a gesture hold can be seen as a marked use in relation to the continuous stream of gestures melding into one another (Waugh 1982). In each instance, not only the form but also the pragmatic function of such hand movements can change: from representational to deictic, or from accentuating the rhythm of the speech to attracting attention and managing interaction with the addressee or audience. As is often the case, one gesture may fulfill several functions at once, whereby additional layers of meaning arise from the location of a gesture in relation to the gesturer's body, gesture space, and artifacts that hands come in contact with as well as the physical surroundings in which the communication takes place.

Gestures are thus not simply visual signs, but visuo-spatial signs, or 'motor signs' (Jakobson 1987: 474ff.) that derive their existence from, and are conditioned by, the very human body that articulates them and by the social and material environment the body interacts with. Consequently, a gestural sign does not exist separate from the human body or the locus of production, and is as such different from many other human visual signs that we can analyze when disconnected in space and time from their creator. In order to analyze gestures, we need to record them in the process of production and capture them via a secondary, artificial visual medium. Only through a mediated view can we reconstruct and understand instances of such locally-anchored meaning. In his essay "On the relationship between visual and

auditory signs," Jakobson (1987: 466-473) addresses the challenge of accounting for the "structural and perceptual relation between visual and auditory signs" (p. 466) and the "functional difference between vision and audition" (p. 467). In both modes, the decoding of a message relies on simultaneous and successive processes of interpretation. In both cases time and space are the two constitutive dimensions:

Both visual and auditory perception obviously occur in space and time, but the spatial dimension takes priority for visual signs and the temporal one for auditory signs. A complex visual sign involves a series of simultaneous constituents, while a complex auditory sign consists, as a rule, of serial successive constituents. (Jakobson 1987: 469)

In order to derive a global sense of a given combination of single signs in either semiotic mode, the mind needs to engage in synthesis, which can be sequential, simultaneous, or both:

Both varieties participate not only in verbal behavior but also in visual experience. While simultaneous synthesis proves to be the determinant of visual perception, this final stage, as stressed by Luria, is preceded by a chain of successive search processes. With regard to speech, simultaneous synthesis is a transposition of a sequential event into a synchronous structure, whereas in the perception of paintings such a synthesis is the nearest phenomenal approximation to the picture of contemplation. (Jakobson 1987:471)

Gestures, the object of contemplation here, seem to be an interesting hybrid between the visual and the linguistic: there are simultaneously present, interacting parameters to synthesize: shape, orientation, location, and trajectory of the hands, which are superimposed upon the temporal, successive unfolding of speech. A cross-modal simultaneous synthesis is needed when matching gestures with the co-occurring sequences of speech

sounds. At the same time, a gesture is, in most cases, a sequential event in and of itself: a sequence of individual hand movements makes up the global meaning of a gesture. How these modes work together in the data of this study, and may be driven by metaphorical and metonymical processes at the conceptual level, will be discussed in detail in chapters IV and V of this thesis.

Taking a slightly different perspective, Bouvet (2001: 2) points out that the 'corporal dimension of language' resides in correspondences between intonation (tonal movement, 'danse tonal' according to Fonagy), visual mimics, and gestural movements. She stresses the spatial projection of intonation from the oral cavity to gesture space, and calls it a retroactive circle of "l'audition et la phonation ou entre la vue et le geste" (2001: 2). Using the latest technologies for analysis, McNeill et al. (2001) convincingly confirmed Kendon's (1972) and Bolinger's (1986) claim that prosody can be regarded as gesture in spoken form, with prosody, linguistic content, and gesture being tightly integrated packages that are at the root of utterance structure and discourse organization. This again stresses the fact that semantically gestural signs are not self-sufficient; they are polysemous signs that derive their particular meaning in correlation with the specific content of the speech they accompany (Kendon 2000).² Besides this interrelatedness of gestural and linguistic meaning construal, gestures, especially representational gestures, have their mode-specific ways of signifying and referring to both the visible and invisible world. In what follows, I will try to illustrate the characteristics

² Except emblems: codified gestural symbols that do not need the verbal context to be understood. An example would be the 'thumbs up' gesture used to express approval.

of the gestural sign in terms of its iconographic qualities and its possible relationships to what it may stand for.

2.2 Motivation of the gestural sign

From the perspective of this study, the issue of motivation is central. The question is to what degree the signifiers of gestural signs witness resemblance with what they signify, how gestures of the abstract are motivated, and how exactly iconicity is at the heart of such meaning-making processes. While there has been a considerable debate regarding Saussure's well-known claim that the signifier-signified relationship that constitutes linguistic signs is arbitrary (1916), gestural signs seem to be fundamentally different in nature, i.e. non-arbitrary and motivated. We could even say that they are intuitive, even though they of course vary with language, culture, personal style, context, and so forth. Apart from culturally-engrained emblems, which do not rely on accompanying speech, they do not build a closed sign system consisting of a conventionalized code and clearly defined signifier-signified relationships. Yet, in the gesture literature, gestures are often globally referred to as 'symbols' (Kendon 1997), which can be misleading if the concept 'symbol' is also applied to those types of gestural articulation that are, from a semiotic perspective, not inherently symbolic, or have not become symbolic within a given context.

In her careful investigations of both French sign language and French co-speech gestures and facial expressions, Bouvet (1997; 2001) consults classic linguistic theories to describe the motivated characteristics of gestural signs.

Doing so proved to be an insightful enterprise on which I will draw here.³

Bouvet (1997: 11) illustrates how Benveniste clarified Saussure's claim that the signifier-signified relationship is arbitrary by maintaining that it is in fact necessary, for the concept of an entity and its linguistic signifier are intricately linked during language acquisition, at least for concrete objects, i.e. the perception of an object and its name are experienced in conjunction. The linguistic signifier and the signified concept are codependent, they exist in "consubstantialité" which, in turn, assures the unity of the linguistic sign (Benveniste 1966: 51). What is arbitrary is the relationship between the linguistic sign and its extra-linguistic counterpart, the referent. That even this link is not arbitrary has been proven by a great deal of work on iconicity and isomorphism at all levels of language (Jakobson & Waugh 1979/2002; Bybee 1985, 1995, 2003; Givón 1985; Hiraga 1998; Haiman 1985; Simone 1995; Waugh 1992, 1993, 1994; Waugh et al. 2004, among others). We will return to these issues in more detail in the discussion of iconicity in chapter III.

In gesture, neither the signifier-signified relationship nor the sign-referent relationship is arbitrary (except for emblems). Representational gestural signs have properties in common with their referents; they rely heavily on the principles of similarity and iconicity. The question here is to what extent the referent or the underlying concept serves as base for the gestural sign that represents it. In other words, to what degree is the form of the signifier determined by what it signifies (Chandler 2002: 25). Eco (1972; Bouvet 1997:

³ Bouvet publishes in French, which has so far delayed the reception of her work in the Anglo-American research communities. It is also for this reason that I find it worthwhile introducing her main observations. Importantly, her account of metaphorically and metonymically motivated gestures will be crucial for the approach taken here.

15) argues that the process of perception is central here, too, and that the gestural sign shares features with the “perceptive model” of the object, and not the object itself. The referent is constructible and recognizable due to the same mental operations:

[...] nous sélectionnons les aspects fondamentaux du perçu d'après des codes de reconnaissance; ainsi, lorsqu'au jardin zoologique nous voyons de loin un zèbre, les éléments que nous reconnaissions immédiatement (et que notre mémoire retient) sont les rayures et non pas la silhouette qui ressemble vaguement à celle d'un âne ou d'un mulet. [...] Ainsi même les codes de reconnaissance (comme les codes de perception) concernent les aspects pertinents. Et ce sont ces aspects qui doivent être communiqué dans le signe iconique. Il existe donc un code iconique qui établit l'équivalence entre un certain signe graphique et un élément pertinent du code de reconnaissance. (Eco 1972:178-9 as quoted in Bouvet 1997: 17)⁴

Eco illustrates his point by taking the example of a little five-year old boy who imitates a helicopter with his entire body by singling out its essential structure and movement: his torso represents the body of the helicopter, his arms represent the two opposite rotors, executing the turning movement of the rotors around a central axis. The boy thus becomes the helicopter.

Interestingly, the boy was not able to draw the helicopter equally well since he had not yet acquired the ability for graphic representation. However, he had

⁴ [...] we select the fundamental aspects of the percept according to the codes of recognition; correspondingly, when we see in a zoo a zebra from far, the elements we immediately recognize (and the ones our memory retains) are the stripes and not the silhouette which vaguely resembles that of a donkey or a [...] in the same way, the codes of recognition pertain (as the codes of perception) to the pertinent aspects. And it is these aspects that must be communicated in an iconic sign. There thus exists an iconic code that establishes the equivalence between a certain graphic sign and a pertinent element of the code of recognition" (translation I.M.).

internalized the main traits of the concept and externalized it through gesture; he knows how to establish a correspondence between his perception and representation through posture and body movement. Bouvet (1997: 17) stresses the point that the pertinent elements of the “code of recognition” are essentially linked to the movement of the formal traits (which were subordinated in his vision).⁵ What is important to realize is that through imitation with his body the boy produces a corporal sign for the concept “helicopter,” or, as Jousse (1978: 435) would say, “un nom gestuel” (a gestural label), depicting the formal essence of an entity as well as its essential movement which can be used independently of the perception or presence of the object.⁶

An important question I see arising here pertains to how such genuine ‘noms gestuels’ can be assigned to invisible, i.e. not yet perceived or physically manipulated, entities that build the foundation for abstract reasoning. It seems to be uncertain that we can rely on effects of “translucidity” of gestural signs as described by Bouvet for sign languages and for gestures. With recourse to Klima and Bellugi (1979), Bouvet (1997) argues that sign language signs are not “transparent,” as it is often impossible to guess what they refer to. However, they can be said to be “translucid,” meaning that we can trace the

⁵ Regarding the form-movement relationship both authors suggest that the code of recognition is more linked to the movement, and Bouvet (1997: 19) then claims that this parameter is the basis for sign formation in French sign language. Taub (2001: 67ff) gives a detailed account of correspondences between shape, size, movement, location of articulators and the referents they represent respectively in ASL.

⁶ Here a link can be made to issues of object permanence in child development and the role of the physical appropriation of the environment, via movement through space and the manipulation of objects, which is followed by a linguistic appropriation of the non-linguistic reality (H. Clark 1973, C. Johnson 1996). During the development of the cognitive and linguistic abilities of the child, gestures (especially pointing gestures) are considered to be crucial intermediary steps facilitating the transition into linguistic communication (Goldin-Meadow 2003).

connection between signifier and signified, in other words, we can discover the motivation behind the connection between these two elements due to the inherent, but apparently not always obvious, iconicity. How then can this inherent iconicity be characterized and how does it motivate gestural signifiers? Another question that follows from the previous ones asks how we need to distinguish iconicity occurring in spontaneous gesticulation from iconicity in sign languages. According to Kendon (1982), these two forms of manual communication are at the opposite ends of a continuum that was termed 'Kendon's continuum' by McNeill (1992): *gesticulation – pantomime – emblems – sign language*, with gesticulation being the least conventionalized system of hand movements and sign language being the most conventionalized one, namely a system that cannot be understood without knowledge of the specific symbolic code of a given sign language. Not surprisingly, spoken language is closest to sign language, both are segmented and analytic in nature, and farthest away from co-speech gesture which is global and synthetic in nature (McNeill 1992, 2000). As opposed to this assumed contrast between iconic and symbolic signs, Taub (2001) and Bouvet (1997) were able to show that iconicity plays an important role in ASL, despite its being based on conventions and rules that differ from one sign language to the next (a more detailed discussion of these issues will be provided in chapter III).

While gesticulating, speakers perform actions in gesture space which are, according to Müller (1998) and Streeck (2002), derived from every-day actions hands engage in continually. Müller developed a system of semiotic

modes of gestural sign constitution based on what the hands actually seem to be doing. In addition to the factors identified above, such mundane actions appear to condition shape and movement of the hands. Seen from this angle, iconicity is the link between the actual gestural movement and the movement it stands for. We can recognize the real action of raising a glass for a toast in the gesture that imitates that action, except that the glass needs to be imagined. According to Müller, we can distinguish between four different modes of gestural sign constitution: A. the hand *acts* when miming an action without real objects (for instance driving a car pretending to hold a steering wheel); B. the hand *draws* when sketching the schematic contours of an object or the direction of a path into the air; C. the hand *molds* when seemingly making a (3-D) sketchy sculpture of an object (a crown, a frame, etc.); and D. the hand *represents* when the entire hand stands in for a piece of paper on which the other hand performs a writing gesture, for example. Gestures, whether they represent something concrete or something abstract, are thus abstracted from everyday practical actions, oriented towards objects and thus grounded in the material world (Streeck 1996). This point was elaborated upon by Lebaron & Streeck (2000) by demonstrating the gradual alienation process that takes place when architects discuss architectural models first in the presence and then in the absence of the actual model. Again, the form a gesture takes is conditioned by the material setting in which it originates.

As will be illustrated in detail in chapters III and IV of this study, there is reason to believe that conceptual metaphor and metonymy motivate how abstract domains are referred to in the gesture modality. While conceptual metaphor (Johnson 1987, Lakoff 1993, Gibbs 1994) has been identified as

conditioning metaphorical gestures (McNeill 1992; Cienki 1998; Sweetser 1998; Müller 1998, 2004b; Kendon 2004), Bouvet (2001) shows in her analysis of a recounting of the fable “Le renard” to what degree gestural signs may be metaphorically and also metonymically motivated. Bouvet does not, however, apply Jakobson’s theory which can, as I will argue, shed light on how these two mechanisms of signification are at work within one mode and across modes.

2.3 Language, gesture, and thought: Psycholinguistic underpinnings

While gesture is a corporal medium, what we convey and how we express ourselves via gestures is obviously driven by our ideas, mental imagery, emotions, and communicative intentions. Gestures, as McNeill puts it, provide a window on on-line thought processes; they are both an act of communication and an act of thought (McNeill 1992: 246). Within the range of their expressive capacities, hands may reveal thoughts and sentiments speech conceals; they may express our inner world physically, including memories and visions for the future. This occurs consciously and unconsciously, since through gestures “people unwillingly display their thoughts and ways of understanding the events of the world” (McNeill 1992: 12). By providing visual information language cannot convey, they enhance communication and are an outlet for metaphoric articulations of emotions and abstract thought, naturally grounded in the concreteness of the human body as well as the social practices in which it engages.

Psychologists and linguists have attempted to provide accounts of how exactly the collaboration of linguistic and gestural expression of an idea might work, how gestures may affect thought, and how linguistic relativity is reflected in different patterns of gesture-speech synchronization. McNeill bases his theory on the Vygotsky-inspired assertion that "gesture and speech arise from a single process of utterance formation" (McNeill 1992: 29; Vygotsky 1986), whereby gesture imagery (characterized as global, synthetic, and idiosyncratic) and linguistic structure (characterized as linear, segmented, and hierarchically organized) dialectically represent different aspects of thought, which appears to be inherently multi-dimensional, i.e. imagistic and verbal (1992: 246ff.). As we will see later in the dissertation, the gestures in the present data also convey very specific information. It is further being maintained that, conditioned by the semiotic and psychological constraints of each mode, both channels shape the process of utterance formation in terms of contributing meaning and structure, setting rhythmic pulses, devising discourse segments, as well as expressing contextual relevance and other pragmatic factors. In concert, gesture and speech carry out a continuous and gradual transformation of thought (McNeill 1992: 247). Hence, thought is articulated through dialectic synthesis, in a way that is both colored by the individual style of a speaker and sharable in a given socio-cultural context (to a certain degree even across cultures). Gesture and speech thus assume complementary roles in carrying out a single plan of communicating about the world, both about abstract or concrete domains of experience (Kendon 2000). Gestures may disambiguate linguistic information and thus make meaning more precise (by, for instance, pointing at a concrete referent that is linguistically only referred to via an unspecified pronoun), or add components

of meaning not expressed in the speech they accompany (Kendon 2000: 53). At the same time, language disambiguates gestures which are, as pointed out earlier, highly polysemous signs and often need the linguistic label to be correctly deciphered.⁷

Idea units unpacked: Growth Points

In search of a unit of analysis of such speech-gesture synthesis and co-expressivity, McNeill and his colleagues (McNeill 1992, 1999; McNeill & Duncan 2000) suggested the model of the “growth point,” the initial form of a thought which encompasses both mental imagery and linguistic categorical content. It is supposed to represent a moment where a discontinuity of idea generation occurs, i.e. a mental change, often implying the preparation of a new topic in the ongoing discourse (McNeill 1999: 79). The growth point is also understood as the initial organizing impulse of the utterance, the cognitive starting point, or the core idea of the utterance as it comes into existence. It is said to encapsulate the newsworthy content in the immediate context, the point of departure from the context which is, in this theory, understood as the background from which a psychological predicate (Vygotsky 1986) is differentiated. While construing a stretch of discourse, speakers are supposed to shape the development of ideas such that new, significant information is introduced in contrast to the already established background (McNeill 1999: 80). In other words, the formation of a growth point may entail the highlighting and differentiating of what is novel in a field of contrasts.

⁷ In this sense they have something in common with abstract works of art whose interpretation often relies on cues stemming from the title of a given piece.

The minimal growth point unit of thinking-for-speaking (Slobin 1996) thus contains both imagery and linguistic categorical content in the initial stages and then develops into a verbal utterance accompanied by gestures. The latter are prone to externalize aspects of visual structure and may ground linguistic categories in a specific visuo-spatial context (McNeill 1999: 80). Thereby linguistic categorization plays a central role as "it brings the image into the system of categories of the language, which is both a system of classification and a way of patterning action" (p. 80). This is what McNeill and Duncan call 'unpacking' the growth point: "The surface utterance works out the implications for the GP and finds a grammatical framework in which to fit it. Thought undergoes continuous change during this process, thus shaping thinking while speaking" (McNeill & Duncan 2000: 146).

It is noteworthy that linguistic relativity is an important factor in determining how the thinking-for-speaking is conditioned by the morphosyntactic encoding mechanisms in a given language. Speakers from typologically different languages may share a comparable mental imagery and still categorize the image of an event differently in terms of agentivity, manner, directionality, etc. (McNeill & Duncan 2000: 147-156).

Building on the theory of growth points and McNeill's (1992: 245) claim that gestures "together with language, *help constitute thought*," Kita (2000) accentuates the cognitive functions of representational gestures, i.e., the kinds of gestures this dissertation focuses on. While giving credit to the 'lexical

'access hypothesis' and acknowledging that these gestures may serve to facilitate lexical retrieval during word searches (Krauss et al. 1996; Levelt 1989), Kita stresses the fact that this can be seen as only one of their functions and that certain representational gestures seem to help the speaker order and formulate their ideas.

It is also assumed that growth points are linked to consciousness, by having a dynamic unfolding that is characteristic of the stream of consciousness and based on cross-modally packaged meanings (McNeill 1992: 86). McNeill (1992) introduced the "concept of cycles," pertaining to the constant movement from organized wholes of imagistic and linguistic forms to their disorganization into fragments through a sort of self-disintegration, a point at which the speaker's ideas supposedly are most open to new directions (p. 87). According to this model, gestures help organize thought, particularly thought involving spatial information and spatial relationships, as a study by McNeill et al. (2001) has demonstrated. In the present study, abstract spatial organization (sentence structure) and how it is made more concrete and tangible by the gesture modality are issues of particular interest. Already from a first impression of the data it seems that it has the potential to complement what McNeill et al. (2001:12) maintain concerning descriptions of concrete spatial configurations (such as living space): "Gestures with hands are seen in abundance when people describe spatially organized information." The authors demonstrate in detail how gesture, prosody and spoken discourse form an integrated system of conveying information:

There is evidence --- in our view, critical evidence --- that the underlying force behind the integrated triad of kinetics, spoken discourse structure and prosody, is *gesture*, especially with topics where spatial description plays a crucial role. Whether more abstract topics are also differentiated via gesture remains to be seen. The evidence that gesture leads the way, at least in living space descriptions, takes the form of a greater differentiation of information in gesture than in the other legs of the triad at the same points in the discourse (italics in the original). (McNeill et al. 2001: 28)

Using a different approach and technology, the present study attempts to shed light on how abstract topics are conceptualized and communicated about in meta-linguistic discourse and gesture. In particular, it investigates the gestural differentiation of abstract spatial structures.

Discourse cohesion: Catchments (McNeill et al. 2001)

Besides the growth point, McNeill and collaborators suggested, in the above mentioned study (2001), the 'catchment' as another, more comprehensive, unit of analysis: "two or more gesture features recur in at least two (not necessarily consecutive) gestures. [...] A catchment is a kind of thread of visuo-spatial imagery that runs through a discourse to reveal the larger discourse units that emerge out of otherwise separate parts (McNeill et al. 2001: 10). These observations were inspired by Kendon's (1972) identification of 'locution clusters', which can be understood as 'paragraphs of meaning' where a discourse theme is elaborated through the temporal integration of the three hierarchies of communicative action: kinesic, prosodic, and discursive.

McNeill et al. (2001: 10) state that "[i]ndividuals differ in how they link up the

world into related and unrelated components. Catchments give us a way of detecting these individual grouping patterns, which are a version of one's cognitive style."

An especially interesting observation (McNeill et al. 2001:11) pertains to the two levels of content of a gesture within a given context: the gesture's own semantic content (referential) and the information it highlights within a thematic segment made visible by a catchment (discursive). Based on recurrences of formal features, a catchment "provides a gesture-based window into discourse cohesion" (p.11). In the context of explaining sentence structure, we can imagine, for instance, the former to represent a sentence as an imaginary object, extending from the left to the right of the speaker, and the latter as highlighting the boundaries of particular words or phrases within the previously outlined sentence.

Generally, the idea of discourse themes seems to be pertinent in structuring a lecture, introducing step-by-step new concepts that make up a theoretical framework, and thus pursuing specific communicative and pedagogical goals. The claim that "motion, prosody and discourse structure are integrated at each moment of speaking" (McNeill et al. 2001: 9) could be taken to suggest that these three components always work together. It is evident, however, that there are often long stretches in conversations, narratives, or lectures, where speakers do not gesture at all while the discourse may still be cohesively structured and delivered.

In this work, the focus is placed on the gestural rendition of figurative thought and spatial cognition and not so much on issues of the exact, second by second, synchrony of gesture and speech, as investigated by McNeill and colleagues. It thus assumes neither the growth point nor the catchment model. However, the research discussed above merits consideration, as it informs us about the extremely close relationship between thought, language and gesture.

2. 4. Material environment, embodiment, and abstract reasoning

Given the central place the notion of *embodiment* occupies in cognitive linguistics and other theories of meaning-making that also account for sensual and multi-modal implications, exploring bodily communication seems to be a natural endeavor to gain insights into embodied and situated aspects of cognition, language, and knowledge mediation (Dirven, Ziemke, & Zlatev fc.; Furuyama 2000; Gibbs 1999, 2003; Goodwin 2001; Kramsch 2002; Kress et al. 2001; McCafferty 2001; Ochs et al. 1996; Richardson, Spivey, Edelman, & Naples 2001; Richardson, Spivey, & Cheung 2001, Richardson, Spivey, McRae, & Barsalou 2003; Roth 2003).

The teaching context, which can be said to bear high *communicative dynamism* (McNeill 1992), entails specific cognitive and interactive demands as well as the goal of enabling students to acquire specific cognitive abilities. Teaching linguistics takes place in a specific environment and involves a

particular use of space – including gesture space – as well as interaction with specific mediational tools ('material anchors' in Hutchins' (2002) sense). Here, as in any other kind of scenario, discourse pragmatic forces seem to shape not only linguistic form and information flow, but also the use of certain types of gestures, with each of them fulfilling specific functions.⁸

Compared to genres like narrative and conversation, classroom lectures entail expository discourse with a pedagogic function, and even though the teacher might reach out to the audience and interact with students to solicit feedback and answers to her questions, the nature of the discourse is monologic rather than dialogic. The teacher's actions and explanations are goal-oriented and driven by the intention to convey new knowledge, tailored to the needs and background the students have at a given point in time.

Focusing on the teacher's performance (and not on the interaction between teachers and students), the video recordings show what efforts teachers make to render abstract subject matter more concrete and *graspable* by handling imaginary objects, e.g. those representing grammatical categories, or by tracing diagrammatic sentence structure in the air.

Meta-linguistic knowledge differs from general knowledge about the physical world in that it is acquired long after the ground-laying process of first language acquisition is completed, as it is promoted and reinforced through literacy and teacher-mediated practices during lessons in grammar

⁸ Müller (1998) argues for a functionalist approach to gesture and establishes an insightful system of referential, performative and discursive gestures (1998: 113).

and rhetoric. Students learn how to construct correct sentences and express meanings. But how do they perceive of the building blocks of a sentence? How are linguistic representations built and used? Investigating the material basis of gestures produced by architects, Streeck and LeBaron (2000: 118) convincingly argue that gestures do not simply reflect mental representations, but "originate in the tactile contact that mindful bodies have with the physical world." Compared to architects who start from three-dimensional architecture models, linguists have no immediate subject matter to take as the concrete base for their linguistic explanations and gestural abstractions. Rather, they rely on the mediated graphic representation of words and sentences on paper, blackboards, and overhead transparencies. It also needs to be taken into account that the culturally ingrained practice of reading and writing from left to right (at least in Western cultures) conditions basic spatial conceptualizations of the sentence as a horizontally elongated object evolving in time and from left to right (Kress & van Leeuwen 1996, Olson 1994).⁹ In linguistics courses, instructors go a step further in trying to implant theoretical concepts, symbols, and views of sentence structure in the students' minds so that they can use them correctly afterwards. Dissecting sentences into constituents with distinct functions and drawing sentence diagrams are symbolic activities both teacher and student engage in, reinforcing the experience of internalizing these concepts as a foundation for abstract reasoning in this domain.

⁹ In this context, Lakoff & Johnson (1980:126) refer to the TIME IS SPACE metaphor and point out that spoken language precedes written language: "Since speaking is correlated with time and time is metaphorically conceptualized in terms of space, it is natural for us to conceptualize language metaphorically in terms of space. Our writing system reinforces this conceptualization. Writing a sentence down allows us to conceptualize it even more readily as a spatial object with words in a linear order. Thus our spatial concepts naturally apply to linguistic expressions."

Functioning on the cognitive, linguistic, interpersonal, and ecological plane simultaneously would not be possible without conceptual metaphor (particularly spatial metaphor, Boroditsky 2001), metonymy, and the conceptual integration of physical space and conceptual space (Coulson & Oakley 2000; Liddell 2003); Fauconnier 1994; Fauconnier & Turner 2002, Lakoff & Núñez 2000).¹⁰ Sweetser and Parrill (Austin Conference Proceedings, 2004; Parrill and Sweetser 2004) applied the theory of mental spaces (also called blending or conceptual integration) to gesture, demonstrating how real space, gesture space, and conceptual space map onto each other and allow for new, emerging understanding of events described via speech and gesture. The authors argue that this holistic approach provides a way to understand how these different levels correspond in structure with one another.

The way to describe iconic/metaphoric/deictic mappings as succinctly as possible, we claim, cannot be reduced to the physical features of the produced gestures. As with most systems, before giving a succinct description of something it is necessary to know (in principle, at least!) how to describe it as fully as possible. And the meaningful interpretation of gestures can be expressed concisely only against a background of complex cross-space mappings. To some extent, gesture is about representing entities in mental spaces. These entities are set up and manipulated through rapid transitions between discourse spaces and iconic representations of entities in those spaces. The fact that the mental spaces framework is a spatial representation of abstract information entails that it is an invaluable resource in making mappings between these entities and their referents explicit. (Parrill/Sweetser 2003, p.1)

This study is an attempt to account for both the morphology of gestural signs and the conceptual processes that can be assumed to underlie form-meaning mappings in a given communicative situation and environment.

¹⁰ For a discussion of metaphors underlying mathematical thought see Lakoff and Núñez (2000) and Núñez (2001).

3. Structure of dissertation

The dissertation is structured as follows. In chapter I, I lay out the semiotic foundations of this study by drawing on traditional semiotic theories. I will present the main tenets of Peirce's semiotic theory and Jakobson's theory of metaphor and metonymy and suggest ways the semiotic modes these put forward may be applied to co-speech gesture. Chapter II introduces the methodological approach developed for this dissertation, including the schemes used for discourse transcription and gesture annotation. In chapter III, I will discuss in more detail the different modes of iconicity Peirce proposes and will illuminate the ways in which Peircean semiotics and cognitive metaphor theory can cross-fertilize each other. This will be done in relation to both language and gestural modalities (signed languages and spontaneous gesture). In chapter IV, I examine the interplay between icons and indices in gesture. Through this, I illustrate the different types of iconicity with examples taken from the data, and further propose several modes of indexicality in gesture. Chapter V contains two different approaches to the data. First, I present the morphological inventory of the gestures in the data, by discussing and illustrating the salient hand shapes and motion patterns that have emerged from the data. Second, I will give an overview the principal metaphorical understandings of basic linguistic units, sentence structure, and linguistic theories, as they surface from the data. The final sections offer insights into the interaction between metaphoric and metonymic modes in gesture, as well as additional metonymic modes from the perspective of contemporary theories of metonymy. The dissertation concludes with a summary of the main findings and a discussion of potential avenues for future research.

CHAPTER ONE

SEMIOTIC FOUNDATIONS

This study investigates the interplay between two sign systems: spoken language and gesture. It thus deals with two different channels, the auditory and the visual, and consequently with two different modalities, the linguistic and the visuo-motor. By considering the different material and communicative properties of each sign system, this introductory section illuminates the ways in which both of them function in a given communicative act.

Semiotics, as the general theory of communication by signs, will serve as the broad theoretical foundation. Assuming this relatively wide perspective from which to zero in on particular theoretical standpoints and fine-tune analytical needs has at least two rewards. First, it provides a descriptive apparatus apt to discern not only the idiosyncratic principles at the root of each sign system but also to examine how exactly they interact. As gesture researchers have long realized, linguistic approaches lack the analytical tools and categories needed to adequately describe gestures in terms of their formal, semantic, and functional characteristics. In other words, one needs to be careful not to simply apply theories that were developed for an auditory sign system to visual sign systems (Jakobson 1987, on the relation between auditory and visual signs).¹¹ This is also true with regard to sign languages such as American Sign Language (ASL). Using Peirce's typology of signs and

¹¹ While semiotics is a vast field, I will concentrate on those of the most eminent theories that are relevant in the context of this study.

Jakobson's theory of metaphor and metonymy, I will try to shed light on both similarities and differences of the two sign systems and on how they complement or parallel each other in the constitution and communication of a global message.

Second, semiotics will serve as the overarching theoretical framework, providing a structure in which to discuss established approaches to co-speech gestures, cognitive metaphor theory, and Jakobson's account of metaphor and metonymy. This is the first work to combine these three perspectives in the field of gesture research. While Peirce's theory is claimed to build the basis of the dominant gesture theories (McNeill, etc.), the commonly-used gesture categories (*iconics, deictics, beats, metaphorics, emblems*) correspond to only some of the different levels of Peirce's taxonomy, and we will see that some of the not widely-used sub-categories put forward by Peirce are apt to capture fine distinctions regarding the different types of relations between gestural signs and denoted concepts, especially those frequently occurring in the data of this study.

Taking a close look at the cognitive, semantic and pragmatic principles of semiotic mediation via language and gesture in the linguistics classroom, my aim is to give a systematic account of the specific qualities and functions that allow gestures to convey the kind of information they do, taken by themselves as a unified sign system as well as in concert with the meta-grammatical discourse they accompany. I will thereby focus on how gestures represent abstract concepts and structures and on how figures of thought may be reflected in communicative actions of the hands.

1.1 Charles Sanders Peirce: Semiotic modes of presentation, representation, and interpretation

Given the emphasis on social interaction and knowledge mediation in a teaching context, using Peirce's pragmatist theory is an appropriate choice, as it is, in contrast to Saussure's well-known and widely-accepted static model of the linguistic sign, based on a dynamic understanding of the sign and can be applied to various sign systems. This wide range of applicability makes Peirce's theory particularly valuable in gesture research (cf. McNeill 1992). According to Peirce, "we think only in signs" (Peirce 1960: 169, 2.302), and the universe is "perfused with signs" (Liszka 1996: 20, MS 634: 18). Gestures are undoubtedly part of the semiotic body, or landscape, we draw on and interact with daily in the search for meaningful communication.

We seem as a species to be driven by a desire to make meanings: above all, we are surely *Homo significans* – meaning-makers. Distinctly, we make meanings through our creation and interpretation of 'signs'. Signs take the form of words, images, sounds, odours, flavours, acts or objects, but such things have no intrinsic meaning and become signs only when we invest them with meaning. (Chandler 2002: 17)

Compared to the Saussurian dyadic model (with signifier and signified, 1915), Peirce's triadic model includes a *representamen* (the form the sign takes), an *object* the sign refers to as well as the sense that a sign evokes in the mind of its receiver (Saussure 1967: 26). Peirce calls the latter, that is, the impression the representamen leaves in the receiver's mind, the *interpretant* (not to be confused with the person who receives the sign, the interpreter). The interpretant gives rise to other signs, thus constituting the semiotic process of limitless circulation and interpretation of signs that derive their meaning only

in the active process of *semiosis* in a given communicative act. In line with Bakhtin (1981), Peirce sees thought as dialogical and social (Chandler 2002, 33). Signs are never self-referential, but point to something other than themselves; they need an interpretive mind to receive their meaning. The following quote encapsulates Peirce's sign model:

A sign ... [in the form of a *representamen*] is something which stands to somebody for something in some respect or capacity. It addresses somebody, that is, creates in the mind of that person an equivalent sign, or perhaps a more developed sign. That sign which it creates I call the *interpretant* of the first sign. The sign stands for something, its object. It stands for that *object*, not in all respects, but in reference to a sort of idea, which I have sometimes called the *ground* of the representamen. (Peirce 1960: 135, 2.228; italics in the original)

The part of this model that is not easy to seize is the *ground* of the representamen, which is that quality of a representamen that actually acts as a sign in a specific event of interpretation and that mediates by bringing the object and a mind together via an idea. It represents the relevant properties of the sign vehicle, whereas some of its other properties might be irrelevant in a given communicative act and thus remain insignificant. For example, in an uttered word, a particular combination of phonemes gives rise to its meaning and interpretation. However, the pitch with which the word is produced or the individual coloring it receives from the person who pronounces it might be irrelevant, even though all these features jointly make up the material sign carrier, e.g. the speech sound (Jakobson & Waugh 1979/2002).

1.1.1. The three typologies of signs: Relationality as heuristic principle

Peirce established three different trichotomies of signs (Peirce 1955: 7) reflecting the three elements of the sign: the sign itself, the sign in relation to its object, and the sign in relation to its interpretant. The first trichotomy concerns the *presentative* character of a sign, e.g. those characteristics that constitute the ground of the sign and therewith the basis on which the sign can represent its object. It establishes the correlation between sign and object (Liszka 1996: 37). The *representative* condition of a sign regards the different types of relations between sign and object, which are captured in the second trichotomy (*icon, index, symbol*). And finally, the third trichotomy is a typology of signs in regard to their *interpretative* power from the perspective of the interpretant.¹²

In essence, the sign is relational in character. In each triad, Peirce systematically describes the relata as a *First*, *Second*, and *Third*. The three universal categories of *Firstness*, *Secondness*, and *Thirdness*, developed in his logic of relations, are defined as one-place, two-place, and three-place (monadic, dyadic, and triadic) relations, and have the status of a heuristic principle (Oehler 1987: 7).

A complete triadic relation is one in which no two of the three correlata are related to each other without the mediation of the third correlatum. Precisely the same is true in the sign relation: the sign connects the object and the interpretant, the interpretant connects sign and object, and the object connects sign and interpretant. (Oehler 1987: 7)

¹² Words highlighted in italics represent terms, coined by Peirce, that are mentioned for the first time.

Thus in the semiotic process, "grounding, representation, and interpretation are triadically interdependent" (Liszka 1996: 18).

A) First trichotomy: The sign itself

In the first trichotomy, which concerns the character of the sign itself, Peirce refers to the mere qualitative dimension of the sign as the *qualisign*, existing in firstness, which needs to reside in something else to become active for interpretation. It characterizes the sensory quality of a sign, e.g. its visible appearance such as the color green, and thus refers to the *presentative* nature of the sign, prior to any kind of embodiment or any relational actualities. The instantiation of a quality, e.g. its specific existence in an actual dynamic sign (the *sinsign*), takes place in the realm of secondness, e.g. it gets materialized in the here and now (for example a green chair). It can involve one or several qualisigns (Perice 1995: 7). In thirdness, representation is secured on the basis of convention or tradition, and the signs (*legisigns*) themselves express a law, representing established categories and general types that are embodied in sinsigns (*replica*).

A *Qualisign* is a quality which is a Sign. It cannot actually act as a sign until it is embodied; but the embodiment has nothing to do with its character as a sign.

A *Sinsign* [...] is an actual existent thing or event which is a sign. It can only be so through its qualities; so that involves a qualisign, or rather, several qualisigns. But these qualisigns are of a peculiar kind and only form a sign through being actually embodied.

A *Legisign* is a law that is a Sign. This law is usually established by men. Every conventional sign is a legisign [but not conversely]. It is not a single object, but a general type which, it has been agreed, shall be significant. Every legisign signifies through an instance of its application, which may be termed a *Replica* of it. (Peirce 1955: 7, italics in the original)

The presentation of the object in the sign serves as the basis for its representation (Liszka 1996: 21). Thinking of gestures, it is reasonable to assume that a single gesture consists of several qualisigns (hand shapes, movements, etc.) that act simultaneously in one sign. Even though they cannot be directly compared to distinctive features that determine the sound, shape, and meaning of linguistic signs, the different formal parameters such as hand shape, orientation, movement trajectory and location have been treated as morphological elements in the description and interpretation of gestures (McNeill 1992; Kendon 2004; Webb 1996).

However, only a subset of the properties that make up the global gestural sign acts as a sign and becomes significant (i.e., the ground, according to Peirce's terminology). Certain properties (location, arm configuration, curled or flat fingers, for instance) might be irrelevant for the communication of one specific idea, but relevant in another event. Particularly, gestures produced close to the head, pointing to processes in the mind, receive some of their meaning from their precise location and would not make sense if produced in relation to other body parts. Whether a person points with one or two fingers at her forehead might not have any consequence in terms of the interpretation of the gesture. There are thus also features that do not partake in the ground of the sign.

The meaning of any sign only arises in the active process of interpretation which involves all three parts of the sign process: sign, object, and interpretant. 'Nothing is a sign unless it is interpreted as a sign', declares Peirce (1931-58, 2.172). Anything can be a sign as long as someone interprets it as 'signifying' something – referring to or standing for something other than itself. We interpret signs largely unconsciously by relating them to familiar systems of conventions. (Chandler 2002: 17; *italics in the original*)

One interesting aspect about spontaneous gestures is that we cannot really assume that they are consciously perceived and interpreted by the addressee at all times. Yet they are a familiar system of bodily communication, and may express information not rendered by speech, without which the entire propositional content of a message often would not be conveyed. With Peirce's trichotomy in mind, we might be able to hypothesize that gestures add supplementary qualisigns that, by the virtue of having a different materiality and using the visual channel of communication, differ from linguistically instantiated qualisigns in terms of function, semantic content, and sensory perception. Representational gestures, which are the focus of this work, do not, for the most part, rely on law-like relations between signifier and signified (thirdness), and we may say that they primarily partake in firstness and in secondness as actual instantiations of certain qualisigns in gestural signifiers. The question here is whether there are legisigns behind the actual hand signs, or, put differently, whether they are sinsigns that don't necessarily have a type/token relationship manifesting a habit or rule. Every sign has to be a qualisign and sinsign, but is not necessarily a replica of a legisign (as in language). Whether or not there is a corresponding type in thirdness is one of the major questions that motivate this study. That is, the question is whether these gestures are 1) habits (for the gesturer or the addressee), 2) socially codified and conventionalized beyond a single gesturer/gesturee), 3) have systematic relations with each other, and 4) are law-like.

B) Second trichotomy: Relation of the sign to its OBJECT

A sign must represent an object. Peirce's understanding of what an object can be is extremely wide and ranges from existing to non-existing things including possibilities, goals, qualities, feelings, relations, modes of being, acts, etc.

(Liszka 1996: 21). Anything can be an object, as long as it is represented by a sign (Shapiro 1983: 25). Representational gestures, too, may depict all kinds of things: concrete or abstract entities, attributes, actions, functions, etc. Peirce differentiates between the dynamic object, which is assumed to determine the sign (perspective of sign sender), from the immediate object as represented in the sign and interpreted by some interpretative agency (perspective of sign receiver). The latter exists only inside of the sign relation. By contrast, the dynamic object may exist independently of any act of representation; it nevertheless may compel the sign and drives the semiotic process (1960: 8.314). While being the object that is signified by the representamen, it does not necessarily reflect the object as it exists in the real world. We can imagine it, for instance, as the mental image a speaker has of an entity or a situation that he or she wants to convey through linguistic signs, visual signs, or a combination thereof. In any event, the dynamic object remains unattainable for the interpreter who, relying on the mediated rendition of the dynamic object through the ground of the representamen, first of all tries to understand the sign as representing something. So "[r]epresentation is only possible through the mediation of grounding and interpretation" (Liszka 1996: 22).

In each communicative process, the object signified by the sign presumably differs from the object that the interpreter thinks the sign refers to. Misunderstandings arise when the gap between the dynamic object and the

immediate object is too big. Taking this a step further, Peirce argued that through scientific inquiry we continuously develop a better understanding of the universe that exists independently of our attempts to comprehend it and that is only accessible to us through semiosis. In other words, our semiotic means help us get closer and closer to the natural world that exists outside of us, thereby reducing the gap between the dynamic objects and the immediate objects, e.g. between how the natural world works and how we think it works.

How then can we assume the interaction of dynamic and immediate objects to be at work in gestural signs? Also, the question of the degree to which abstract dynamic objects, such as grammatical categories and structures, differ from concrete dynamic objects is crucial, as the dynamic object is said to exert force on the sign and hence on the immediate object as well. Any sign, or representamen, unveils some particular features of its object. Its ground has the mediating role of letting the object transform itself into a general idea that then can locate itself in the mind of the interpreter (Corrington 1993: 150). Due to their materiality, gestures can be assumed to present different grounds for mediation than linguistic signs do. As pointed out earlier, gestural signs do not stand in all (visual) respects for what they represent; they only depict the locally salient properties of an object or action in a rather schematic way. For example, when producing a gesture with two hands, seemingly holding a shoe box by its sides, we do not need to trace all the sides and dimensions in order to convey the idea of an elongated three-dimensional object. As will be discussed in detail later, it is in fact the action of holding an imaginary box that stands for the object itself. Representational gestures obviously differ from other forms of more direct, literal visual

representation such as photographs of objects, places, or people, even if those too can only reduce and approximate the dynamic object. If one wanted to make a connection to the visual arts, gestures could be said to be more like abstract paintings.

With regard to abstract concepts, issues of determination of the sign as well as representation of the object are yet more complex: The sign producer needs to make a metaphorical detour via an object that stands in for the original dynamic object, and this detour has to be followed inversely by the message decoder in the interpretive process. As abstract entities tend to be conveyed in terms of concrete entities, it is the concrete source domain of a metaphorical mapping and not the abstract dynamic target object, that surfaces in the gesture modality.

Due to their immaterial character, abstract dynamic objects are not only difficult to define or represent, they seem to be even more unattainable than the tangible natural world around us. Thanks to the perpetual interaction between dynamic objects and signs, however, “the underlying dynamic objects are enhanced in their power by the signs that bring them more and more into concrete orders of relevance” (Corrington 1993: 158). We can expect this to hold in regard to abstract domains since their participation in semiosis, as well as the circulation and augmentation of the corresponding knowledge, relies heavily on mediation via linguistic and visual representation. We will see later in this study how gestural representations of abstract objects rely on, or are motivated by, the interaction of linguistic and gestural meaning construal as well as metaphorical mappings, iconicity, metonymy, and

polysemy.

In the second triad, Peirce distinguishes between three, well-known, kinds of relations between sign (the ground of the representamen) and signified object: icon, index, and symbol. It is important to keep in mind that they are not to be understood as mutually exclusive categories, but rather as semiotic modes that can overlap in a particular process of signification (Chandler 2003: 43; Hawkes 1977: 129). There are thus in principle no pure icons, indices, or symbols and that a sign can represent any combination of the three. These modes of relationships between the sign vehicle and its referent reflect the degree to which the signified determines the signifier. While iconic and indexical signs tend to be highly motivated through similarity and contiguity respectively by their referent, their interpretation can still rely on cultural conventions (such as in the case of films and photographs). Symbolic signs, on the other hand, tend to exhibit a high degree of arbitrariness and need to be learned. But they can also incorporate iconic dimensions, as it is the case with onomatopoeic words or sign language signs. "Any given sign will privilege one of the three relational possibilities. Yet the others will be manifest to some degree" (Corrington 1993: 147). Which of the semiotic dimensions take dominance over the other in a sign is determined by context and communicative intention in each particular usage event.

In an icon, the relation between sign and object is based on similarity: The signifier is taken to resemble the signified, whether in terms of sound, shape, feel, taste, organization, etc. In Peirce's own words, "[a]n Icon is a sign which refers to the Object that it denotes merely by virtue of characteristics of

its own, and which it possesses, just the same, whether any Object exists or not" (1960: 143, 2.247). An example would be a photograph, a painted portrait of a person, onomatopoeia in language, and also imitative gestures. "Icons have qualities which 'resemble' those of the objects they represent, and they 'excite analogous sensations in the mind' (Peirce 1960: 157, 2.276)" (Chandler 2002: 39). The form the sign takes is thus conditioned, to some degree, by the object or action it refers to. At the same time, even pictures resemble what they represent only in some respects; they reduce three-dimensionality to two-dimensionality, for example, or the colors often are inaccurate. No matter how truthfully they represent reality, pictures, paintings and the like always involve some kind of cultural convention in their production and interpretation (Chandler 2002: 40; Kress & van Leeuwen 1996). And so they actually are "largely conventional in their mode of representation" (Peirce 1960: 157, 2.276). What seems to be important is the recognizable analogy between real world events and their reproduction in terms of configuration of people, landmarks, items, and attributes.

The visual examples mentioned above are to a high degree image icons and one of three sub-categories of icons: image, diagram, metaphor (*Logic as Semiotic*, 10), all of which will become central to the analysis of the gesture data. Diagrams depict the relation of parts to a whole in an analogous, schematic way. Metaphors draw attention to similarities between two concepts, thus highlighting a parallelism. The different types of icons Peirce suggests as well as iconicity in gesture will be discussed in more detail and illustrated in chapters III and IV.

In an index, the relation between sign and object is based on contiguity, on a factual (physical or causal) connection between the two. Smoke indicates fire, a footprint the passing of an animal, a medical symptom a malfunctioning organ, etc. In language, the use of deictic expressions – such as prepositions, pronouns, demonstratives, verbal tenses, and adverbs of time and space – is highly context-sensitive, and depends on the here and now of the speaker or writer (the ‘origo’ according to Bühler 1934). Perception appears to play a crucial role in detecting the link between a demonstrative pronoun and its referent:

The demonstrative pronouns, “this” and “that,” are indices. For they call upon the hearer to use his powers of observation, and so establish a real connection between his mind and the object; and the demonstrative pronoun does that – without which its meaning is not understood – it goes to establish such a connection; and so is an index. (Peirce 1955: 14)

So the signifier is conditioned by the referent: “An Index is a sign which refers to the Object that it denotes by virtue of being really affected by that object” (Perice 1960: 143, 2.248). While being highly iconic, photographs, audio-recordings, and films also have indexical properties, as they directly and dynamically reflect the events and circumstances of their production. In gesture, the orientation that pointing gestures take depends each time on the location of the object they are directed towards. By pointing at something in the proximity of the speaker, the object is established and integrated into the unfolding discourse, and the spatial relationship between the speaker and the referent is highlighted. As is the case with deictic pronouns, deictic gestures bring to light spatial and temporal relationships between objects, events, or people, whether set in the environment or within an ongoing discourse. As

natural as the connection between index and referent is assumed to be, pointing practices are also culturally determined and thus to some degree conventionalized (Kita et al. 2003). More generally speaking, gestures can be said to be deictic by definition; they are always contextualized and indexical of the object they represent. Gestures are genuinely tied to the message and context, and depict a dynamic connection with the concept they refer to, be it abstract or concrete. With the exception of emblems, one cannot abstract to just a code. A code typically consists of symbols, which leads us to the next semiotic mode.

As for symbols, the relation between sign and object is based on conventions (e.g. words in a dictionary): "A Symbol is a sign which refers to the Object that it denotes by virtue of a law, usually an association of ideas, which operates to cause the symbol to be interpreted as referring to that Object" (1960, 2.249). Even though language is the symbolic system par excellence, symbolic relationships are to be found in other sign systems (e.g., religious iconology in paintings, symbolic elements in rituals, traffic signs, etc.). The more the degree of abstraction increases, the less indexical or iconic and the more symbolic a sign is. The arbitrary symbolism in mathematics is an example of an abstract symbolic system of relations. In addition to social or scientific conventions, there can also be a habitual link between object and sign, a connection that can be either inborn or acquired over time. Issues of similarity or analogy with its object are principally irrelevant for a symbol, which is always interpreted based on a habitual use or general rule: It "is a sign that is determined by its object only in the sense that it is interpreted as being such, and is thus totally independent of similarity of physical

connection to its object, e.g. a flag" (Oehler 1987: 6). Without the knowledge of the code, one cannot grasp the symbolic properties of a sign, which is always the individual instantiation (token) of a general law or category (type).

The relationship between signifier and signified is not only context-sensitive, but also subject to dynamic change (Chandler 2002: 44; Culler 1975: 17; Saussure 1967: 74ff.). Signs may shift in mode over time. Possible factors that bring about such shifts include cognitive and social forces, semantic change, metaphorization, habituation through learning, and so forth. Peirce privileged "the symbol-using mind" and posited a general tendency for sign systems to evolve from iconic, the original default mode of signification, to symbolic: "a regular progression ... may be remarked in the three orders of signs, Icon, Index, Symbol" (Peirce 1960: 2.299; Chandler 2002: 44).

With regard to gesture, emblems are predominantly symbolic signs, and accordingly they cannot be deciphered without the appropriate cultural knowledge:

Emblems are part of a social code but are not fully structured as language. They have names or standard paraphrases, are learned as specific symbols, and, are used as if they were spoken words; in fact they are unspoken words (and phrases); but there is no grammar, and emblems are rarely if ever combined. (McNeill 1992: 56)

The interpretation of the same emblematic gesture, such as the Hand Purse, may differ across cultures (Kendon 1981; Morris et al. 1979), and cultures have their idiosyncratic inventory of emblematic gestures (Kendon 2004; Posner & Müller 2004). Moreover, emblems

[...] have standards of well-formedness, a crucial language-like property that gesticulation and pantomime lack. For example, the OK sign must be made by placing the thumb and index finger in contact; using the thumb and second finger does not produce the OK sign. (McNeill 1992: 38)

The important aspect to keep in mind is that emblems can replace speech and do not depend on concurrent speech to be understood; they are often used in environments where linguistic communication is not possible due to noise or distance. Most spontaneous gestures, that are not emblems, cannot be said to be inherently symbolic in strictly Peircean terms. But as Peirce himself points out, a symbol can be embodied in an indexical gesture:

[...] a constituent of a Symbol may be an Index, and a constituent may be an Icon. A man walking with a child points his arm up into the air and says, "There is a balloon." The pointing arm is an essential part of the symbol without which the latter would convey no information. But if the child asks, "What is a balloon," and the man replies, "It is something like a great big soap bubble," he makes the image a part of the symbol. Thus, while the complete object of a symbol that is to say, its meaning, is of the nature of a law, it must denote an individual and must signify a character. A genuine symbol is a symbol that has a general meaning. (Peirce 1955: 17; italics in original)

Gestures have been called symbols and said to be "created –in contrast to retrieved – by the speaker at the moment of speaking" and to be "a separate symbolic vehicle with their own history, finding their own outlet in space, movement, and form" (McNeill 1992: 105). Some gesture researchers have argued that there is a tendency for gestural signs to acquire symbolic status by recurring in a certain context, for example in teaching. If there is a repeatedly found form-meaning mapping, such gestures can develop symbolic character

and eventually form an inventory of symbols that supports the mediation of knowledge, for instance in a physics or architecture class (Roth 2003, LeBaron & Streeck 2002). In what ways a similar evolution of semiotic dimensions can be observed in the data of this study will be discussed in part III of the dissertation. What is said about the extra-linguistic reality, might also hold for meta-linguistic concept and theory formation:

[Symbols] grow along with the evolving universe and the underlying dynamic objects that empower them. There is thus a dialectic (or economy) of power in the unveiling triad. Icons, indexes, and symbols are enhanced in their power by the dynamic objects they serve. Yet, in a different way, the underlying dynamic objects are enhanced in their power by the signs that bring them more and more into concrete orders of relevance. (Corrington 1993: 157/158)

C) Third trichotomy: The relation between sign and INTERPRETANT

The third trichotomy concerns the different kinds of interpretations a sign can evoke in the receiver's mind. One of the strong points of this model is that it includes the receiver as a participant actively involved in the process of making meaning of the signs she or he perceives. Not just active in the psychological sense, but also in terms of one's very own cultural background, life experience, knowledge, judgment, etc. In this way, it is not just a question of detecting the referential connection between signifier and signified, but of instilling the interpretative process with denotations, connotations, conventions, traditions, pragmatic needs, aesthetic predilections, and other associations (Eco as discussed in Kölle 1973: 104). All of these factors determine the interpretant that is produced as well as the ensuing semiotic processes. Hereby the interpretant can be understood not only as one sign but also as a set of signs that is assigned to a sign vehicle, thus providing the

intended object with a semantic structure (Köller 1973: 101). It is this perpetual process that leads to a greater understanding and knowledge:

We must remember that the interpretant is the mature sign that has already been augmented (and hence has greater semiotic density than the representamen). The interpretant is always underway toward further interpretants and seems to 'hunger' to link up with larger units of meaning. (Corrington 1993: 159).

In Peirce's theory, the side of the interpretant weighs more than the one of the sign producer: "In terms of the dynamics of signification, the concept of the 'interpretant' remains uppermost" (Corrington 1993: 159). This study is, for the most part, concerned with exactly this perspective, which is represented by the student audience the teacher's explanations are addressed to.

Just as there are various sorts of objects, Peirce differentiates three types of interpretants, depending on what kinds of counter-parts -- anything from a feeling, an action, etc. (which are all signs) -- the sign produces in the interpreter. The immediate interpretant (firstness) manifests itself in the understanding of the sign as a sign. It "is a potential interpretant that brings a sphere of possible meaning to an interpretative situation." It "maintains some possibilities and denies others" (Corrington 1993: 160). The immediate interpretant may be the first, unreflected, impression of a person, painting, symphony, etc., or in Peirce's words, "the total unanalyzed effect the Sign is calculated to produce, or naturally might be expected to produce" (Letters to Lady Welby, as cited in Corrington 1993: 160). At the same time, it may encompass that which is common, across contexts, to all the possibilities of

interpretation of a particular sign. Jakobson (1991) distinguishes here between two dimensions: a) the range of potentiality, considering all contextual variants and b) the “common denominator,” e.g. the invariant, or general, meaning of a sign across the locally-construed meanings. The gesture analyst, for example, tries to understand what the possible uses and meanings of variants of one gestural form are in order to then abstract, considering the gesture-language mappings, the common semantic features shared by all of the occurrences (cf. Müller’s (2004a) account of the palm-up open hand gesture and Kendon’s (2004) gesture families).

The second type of interpretant, the dynamic interpretant (secondness) is the direct and actual effect a sign has in a given interpretative process, e.g. the reaction a sign provokes in the receiver in a singular event. Of all the possible interpretants, one is chosen over the others: “The dynamic interpretant is what is experienced in every act of interpretation and is different from every other act of interpretation” (Oehler 1987: 6). Given that the actual impact of meaning in each given case varies from person to person, or from student to student in the linguistics classroom, I will not try to make claims about what happens in the mind of the sign receivers. Instead, I will analyze gesture and speech from their point of view.

The final interpretant (thirdness) is any rulelike or lawlike effect a sign has on the interpreter; it is “the interpretant to which the actual process of interpretation tends” (Oehler 1987: 6). “Its products will be thirds, such as laws, habits, dispositions, and regularities; its cousin is the logical interpretant.” It can be understood as “the means by which a sign becomes

connected or interrelated into a system of signs, that is, translated "into another system of signs (Peirce 1960, 4.127)" (Liszka 1996: 27). Habit formation, interacting with cultural and cognitive conditions, is key in this process of generalizing over single instances: "the most perfect account of a concept, or a sign, consists 'in a description of the habit which the concept is calculated to produce' (Peirce 1960, 5.491)" (*ibid.*). The sum of all dynamic interpretants is supposed to point toward the final interpretant which gives them an overall meaning; however, the final interpretant is not the sum of all dynamic interpretants. Put differently, adding up all instances of secondness does not necessarily result in thirdness which requires a law-like step in between. Generally, the higher-order interpretants are developed through the mediation of the lower ones (5.475). Despite this strong focus on the interpretant, one should not, however, lose sight of the nature of the object and sign involved in the process: "The question of interpretation must always proceed from a precise analysis of the nature of the sign" (Oehler 1987: 6/7). Hence, the great importance given here to the characterization of the nature and materiality of gestural and linguistic signs when analyzing the data in search of inherent patterns in forms and uses of co-speech gestures.

The claim that the attribution of meaning to a sign is to be understood as variable and not stable seems to apply to spontaneous co-speech gesture in that gestural signs tend, as pointed out earlier, to be polysemous and context-dependent [Köller compares this tendency to metaphors, not gesture, a thought to be taken up again later when discussing metaphor in gesture]. Also, in what ways speech sounds and gestural signs are combined to evoke an interpretant may differ from event to event, and recurrent gesture-

language combinations might have a slightly different effect with each subsequent co-occurrence. In natural languages, the interpretant may be brought about intuitively or explicitly (Köller 1979: 104), and we can assume that gestures may work in either way. Meanings, and also the meanings of gestures, thus arise as a function of the different components of a sign and the regulations of their use; they cannot, according to Peirce and Morris (Köhler 1973: 109) be regarded as independent entities for which one could search as for ‘blocks made out of marble’ [need to find the exact quote in English]. The question that arises here concerns the ways in which the different kinds of gestures are regulated by their preferred usage in particular contexts. Similarly, Bouvet (2001) states that the goal behind her investigations was to find the hidden semantics, the “code secret” that underlies gestural modes of signification and their interpretation.

Peirce’s third trichotomy divides the possible sign-interpretant relationships into rheme, dicisign, and argument (Peirce 1955: 8f.). This classification goes back to the old distinction of term, proposition, and argument and was modified to be applicable to signs in general (Oehler 1987: 6). Both systems are based on the premise that each sign has a certain interpretative potential: “This is the sign’s power to direct or determine its interpretants toward a certain focus in the interpretation of its object” (Liszka 1996: 40). The question is whether “its Interpretant represents it as a sign of possibility or as a sign of fact or a sign of reason” (Peirce 1955: 7). In what follows, I will try to show to what extend the rheme, belonging to firstness, can illuminate some of the semiotic characteristics of gestural signs. A rheme entails the possibility of a quality to be interpreted as a sign:

A Rheme is a Sign which, for its Interpretant is a Sign of qualitative Possibility, that is, is understood as representing such and such a kind of possible Object. Any Rheme, perhaps, will afford some information; but it is not interpreted as doing so. (Peirce 1955: 9)

The rheme, alternatively called seme, tends to determine the interpretant to focus on the qualitative characteristics of the sign and not so much on any existential or lawlike features it might exhibit. Like a word in isolation, it is neither true or false; in other words, it is pre-relational and carries the potential for interpretation. It represents an object, but does not make a claim. In order to afford information, i.e., to form propositions, it needs to be combined with other signs. Looking at the typical examples Peirce provides, it becomes evident that there is an overlap with deictics and abstracta: demonstratives, personal and relative pronouns, proper names as well as abstract and common nouns.

The common noun or term "human being" in and of itself suggests to human interpreters familiar with the English language the various characteristics which the term connotes, rather than the application or indication of the term as representing of referring to a particular object. These characteristics might be embodied in some possible object, but the sign itself does not indicate what object that might be. In this case the reference of a seme is excessively vague (CP 4.539). (Liszka 1996: 40)

In a way, gestures are also vague in terms of the sketchiness of their execution and the fact that they do not always refer to a particular object, but to some kind of possible object, underlying concept (e.g. repetition, ideas as objects, etc.), or to selected properties of an object such as shape, size, or intrinsic motion pattern. The interpretant then could be some kind of indefinite idea of the characteristics that the gesture, comparable to a

preposition or an abstract noun, refers to: "Because of the indefiniteness of the rheme, it is neither true nor false; it does not make an assertion about something or provide information (although it provides some; 1960, 2.250), but simply exhibits characteristics as such" (Liszka 1996: 41). This observation supports the idea that gestures are genuinely indexical, and it comes as no surprise that gestures tend to accompany not only deictic linguistic expressions such as 'here,' 'now,' 'there,' 'yesterday,' 'I,' 'they,' 'up,' 'down,' 'this,' and 'that,' but also metaphorical expressions. One function inherent to such gestures may be to disambiguate the indefiniteness of closed-class elements and the polysemy that comes with the metaphorical use of words. This study will try to show in what way abstract nouns such as grammatical categories and functions (without existence in the extra-linguistic reality) tend to be referred to with the support of gestural metaphors.

Manifesting itself in secondness, a "Dicent Sign, is a Sign, which, for its Interpretant, is a Sign of actual existence" (Logic as Semiotic, 9). An example of a dicent is a proposition, linking subject with a predicate and thus making an assertion (for instance, 'the chair is green').¹³ A dicent connects sense with reference in a communicative act and combines rhemes into a higher interpretive organization. It determines the interpretant toward the information concerning those characteristics that are true in a certain object (Liszka 1996: 41). Whereas gestures taken by themselves exhibit notably rhematic qualities, they can, in conjunction with speech signs, combine into dicisigns. The word that co-occurs with a gesture can be said to make a claim

¹³ For the different types of propositions, depending on their modality, quality, quantity, and form, cf. Liszka 1996: 41/42).

about the object or action represented in the gesture. For example: 'The object seemingly being held in these hands represents an infinitive.' Although such a scenario involves neither subject nor predicate in the strict sense, there are two cross-modally linked items, namely gesture and word, that seem to be building a sort of proposition.

Here a link can be made to the interrelation of a painting and its title, for the rhematic gesture presents a certain visual quality of something, and the word indicates in categorical terms what this quality is about. Only in the presence of the painting can the title function as a dicent. Particularly in non-representational art, the viewer relies on the interaction between the visual and linguistic information to arrive at the interpretation the artist had in mind. Conversely, there are both concrete and abstract works of art that remain 'untitled,' leaving its interpretation completely up to the beholder.¹⁴ Even representational gestures are, for the most part, insufficiently representational, or too abstract, to be correctly interpreted and analyzed with the concurrent speech suppressed.

In thirdness, an argument "is a sign whose interpretation is directed to the systematic, inferential, or lawlike connection with other signs; it determines the interpretant toward the inferential form or lawlike character of the sign" (Liszka 1996: 42). The mind draws conclusions and sees general or

¹⁴ "Bref, qu'il soit oral ou écrit, le language verbal accompagne souvent l'image, interagit avec elle pour produire un message global et cela de façon tellement constante qu'un message visuel sans commentaire verbal se doit souvent de préciser <sans légende>, <sans titre>, ou encore <sans paroles>, ce qui n'est pas peu paradoxal" (Joly 1994: 20).

habitual patterns in instantiations of a particular rule. Along the same lines, one aim of this study is to detect different degrees of regularity and conventionality in the meaning and use of co-speech gesture. We can imagine that by making a series of propositions, all of which are in one way or another connected with each other, the linguistics professor introduces a certain paradigm consisting of interconnected ideas and claims about the subject matter at hand. We can also say that the instructor is building arguments supposed to convince the students of the validity of the paradigm under discussion.

1.1.2 Abduction

Different types of argument make different claims about the world and trigger different types of inferences in the interpreter. For Peirce, inferences are the essential quality of arguments of which there are three basic types: abduction (firstness), induction (secondness), and deduction (thirdness) (1960, 2.269-2.624; Liszka 1996: 43). Central to an argumentative structure is that it allows, based on what is given and observed, new features to emerge and new connections to be seen:

The argument gathers up the possible qualities in the Rheme, combines them with the particularities of the Dicent Sign, and comes to a conclusion as to the true essence of the sign and its interpretant. Signs are linked together through number of means. They can be linked through simple contiguity, or through the resemblance of qualities. They can be linked through a series of causal connections that may lack purpose and intelligibility, but that have their own inner dynamisms nonetheless. And they may be linked through the power of arguments that connect full-blooded signs to a vast rational network of intelligibility. (Corrington 1993: 153).

Abduction is Peirce's major and most original contribution to the area

of the logic of inference (he credits Aristotle with its original formulation though; Liszka 1996: 64). Abduction, which partakes in firstness, is what every human being engages in when making sense of all the different kinds of semiotic information that our sense organs are exposed to. It goes beyond providing evidence for hypotheses; it involves the formulation of new hypothesis striving to arrive at plausible accounts of surprising events or of observed phenomena that do not seem to fit into a familiar or received pattern of reasoning (Liszka 1996: 65).

Abduction is, therefore, the tentative and hazardous tracing of a system of signification rules which will allow the sign to acquire its meaning. Abduction occurs with those natural signs which the Stoics called indicative and which are thought to be signs, yet without knowing what they signify. (Eco 1986: 40)

There is thus a distinction to be made between propositions that are already verified and those that are tentative and produced in the process of reasoning. These principal forms of reasoning are concerned with “generating and sustaining a conceptual framework in which truth emerges in form of specific arguments. [...] The role of the interpretant is to enhance the original sign and to give it greater scope and efficacy” (Corrington 1993: 153).

Induction is a more ampliative type of inference. It draws conclusions and generalizations on the basis of results obtained from a sample of cases: “By induction, we conclude that facts, similar to observed facts, are true in cases not examined” (Peirce 1960, 2.636). It may also assign credibility to a hypothesis whose consequences can be experimentally confirmed.

Deduction makes explicit what is implicit; it reveals what is there but

has not been consciously noticed or examined. Logical deduction is an argument which shows a necessary connection between premises and the conclusion. Mathematical reasoning, for instance, proceeds deductively (Peirce 1960, 2.778, 4.229; Liszka 1996: 58).

Applying these concepts to the academic context, it appears that the sign producer is working deductively, trying to find the best way to get the subject matter across to the students. The instructor is likely to start out from a general idea and to then divide the ground to be covered into parts that are to be presented in a particular order. Also aware of the global topic, the interpreter (e.g. the student) works deductively, too, trying to make sense of the details that are presented in the course of a class or semester. In addition, this inferential process involves abduction, e.g. going beyond observed cases and accumulating new insights (Corrington 1993: 46).

Building on Peirce's notion of abduction, Eco (1986: 41f.) introduced a further sub-division into undercoded and overcoded abduction. The former captures instances in which the recognition of a phenomenon as the token of a given type is difficult, implying that a rule must be selected among a series of alternatives. By contrast, overcoded abduction functions quasi-automatically, absorbing rather obvious cases where the law is given or applied instantly; the cognitive efforts required to find out how specific information is to be interpreted and related to the overarching theme is minimal. The less coded the information is, the more labor is needed to decode and integrate incoming messages. Eco (1986: 39) suggests a continuum of codedness which evolves between the strongest kind of coding at one extreme to the most open and

indeterminate at the other: A sign can be not yet coded, vaguely coded, in the process of being coded, undercoded, or overcoded. Rule invention, where “the rule acting as an explanation has to be invented *ex novo*,” is an example of creative abduction (such as interpreting poetic texts, solving criminal cases, challenging scientific paradigms; Eco 1986: 42). In each case, circumstantial and contextual clues direct the interpreter toward the determination of the rule.

Although gesture as a system is not as strongly coded as language, Eco’s distinction is useful in this context, where one needs to consider not only the various levels of novelty and difficulty of the discourse content, but also the different types of gestures employed. Repeated occurrences of certain speech-gesture mappings in the same context may contribute to the codification of such forms, pushing initially undercoded signs toward the overcoded side of the spectrum. When encountering a challenging gestural illustration of a new concept, it is through abduction that the interpreter forms hypotheses about the meaning of a given gesture and through induction that the interpreter tests several hypotheses as to what a gestural form might stand for and how to resolve gesture-speech mismatches. Gathering further evidence for assumptions as to what content should be correlated with a given gestural sign, it is integrated more readily. This mechanism is comparable to learning a foreign language in a naturalistic setting where contextualizing lexical items happens over many instances of use, with the difference that gesture can rely on on-line linguistic translation, even if it does not cover all gestural expressions. However, translating from the visual to the linguistic sign system and vice versa (inter-semiotic translation) is something sign

producers as well as interpreters constantly engage in when acquiring and communicating knowledge about the world.

To conclude this introduction to Peirce's semiotic theory, I would like to point out some of the aspects that make this framework particularly useful in the context of this study. One aspect is that Peirce's theory is a theory of interpretation of sign processes, and as such it allows the gesture analyst to take the same position as the student in the linguistics classroom, namely the position of the observer/listener paying attention to what the teacher tries to convey by performing semiotic acts, consisting of both visible and linguistic action. The categories and sub-categories Peirce provides form a powerful lens through which the semiotic phenomena at hand can be observed and discerned in great detail (characteristics of the sign itself, the nature of the object, object-sign relations, sign-interpretant relations, etc.). Peirce's general semiotic theory allows us to illuminate not only the semantic and pragmatic functions of the gestural signs, but also how signs stemming from two sign systems that are quite different in nature are combined and jointly contribute to the formation of utterances. While metaphor occupies a prominent place in Peirce's doctrine of signs, scholars who use Peirce do not refer to him for metonymy per se. As we will see in the following section, Jakobson adopted Peirce's system and attributed an equally important place to metonymy by showing how it can be regarded as an indexical mode.

1.2. Roman Jakobson: Metaphor and metonymy as two opposite modes of association

Roman Jakobson's view of metaphor and metonymy is central to the approach to language and gesture taken here. Jakobson was greatly inspired by Peirce's semiotic theory. He in fact rediscovered Peirce, and made his work accessible and relevant to linguistics as well as related fields, to both American and European audiences (Lodge 1977; Chandler 2002; Waugh & Monville-Burston in Jakobson 1990). Jakobson's theory of metaphor and metonymy, which incorporates, as will be discussed below, some of Peirce's categories, has been successfully applied to analyze a wide variety of literary genres, visual arts, cinema, magic rites, dreams, personality types, aphasic disorders, etc. (Hawkes 1979; Jakobson 1971, 1990; Lodge 1977). This work attempts to show that it also has the potential to illuminate gesture studies.

What makes Jakobson's theory particularly compatible with most of the other theoretical paradigms used in this study is that it can be viewed as one of the predecessors of contemporary, cognitively-oriented accounts of metaphor and metonymy. Already in 1956, in his paper *Two Aspects of Language and two Types of Aphasic Disturbances* (reprinted in 1990: 115-133), Jakobson argued that these two major figures of thought are not merely poetic devices, but two completely different modes of association which structure linguistic as well as non-linguistic messages. While until recently metaphor has received much more scholarly attention than metonymy, Jakobson was the first to pay equal attention to both tropes. In his view, metonymy is not a subtype of metaphor, but, in fact, the two poles create a sort of opposition between each other, e.g. a tension which is at the root of any kind of symbolic

process, cultural manifestation as well as human behavior in general. At the same time, they do not exclude each other; rather, the nature of a given message is dependent on the preponderance of one of the two modes over the other (cf. Jakobson 1990: 130). It is thus important to keep in mind that, just like Peirce's modes of sign relations, metaphor and metonymy are not absolute categories. Building on these considerations, Lodge (1977) envisions a continuum spanning the two poles along which different degrees of metaphoricity and metonymicity, as well as transitional zones between them, are located.¹⁵ In a recent publication (Dirven & Pörings 2002), cognitive linguists revisit and offer a great deal of evidence for Jakobson's theory. Adopting his balanced approach and exploring the interplay of these "two different mental strategies of conceptualization" (Dirven 2002: 75ff.) also proved to be beneficial in interpreting the present discourse and gesture data.

1.2.1 From similarity and contiguity to metaphor and metonymy

The concepts of similarity and contiguity, as the two essential structural relations between signs, build the basis of Jakobson's theory of metaphor and metonymy. As we saw above, similarity is, according to Peirce, at the root of iconic relationships between objects and signs, including metaphor as a specific sub-type of icons. Contiguity, on the other hand, is inherent to indexicality (including deictic expressions and verbal tenses) and, as Jakobson stresses, to metonymy; both mechanisms rely on contiguous relationships between entities in extra-linguistic, discursive, and conceptual space. Here it is

¹⁵ Lodge applied Jakobson's framework to different literary genres and styles and systematically exhibits examples of hybrids such as metonymic metaphor and metaphoric metonymy (1977: 93ff.).

important to note that, as Dirven (2002) pointed out, we need to assume a *conceptual contiguity* and not simply a factual one:

[...] contiguity cannot in all cases be based on a form of objective or 'natural' contiguity. This has the implication that contiguity must be taken to mean 'conceptual contiguity' and that we can also have contiguity in those cases where we just 'see' contiguity between domains. (Dirven 2002: 90-91)

This approach appears particularly apt when dealing, as in this study, with abstract concepts and structures and their figurative transformations expressed in different modalities.

Jakobson's idea of a spatial and temporal neighborhood provides an insightful way to imagine contiguity relationships (Waugh & Monville-Burston 1990: 17). Words, events, things, and actions performed by persons can be experienced as successive in time or adjacent in space. "From this angle one of the essential differences between spoken and written language can be clearly seen. The former has a purely temporal character, whereas the latter connects time and space (Jakobson 1983: 71). Similar interactions can be observed in gesture, where spatial contiguity intersects with the temporal contiguity which prevails in (spoken) language. Succession and closeness in time as manifested in spoken language are comparable to succession and closeness in space as observable in gesture. Language and co-speech gesture encompass both succession and simultaneity (co-existence).¹⁶

¹⁶ Here a link can be made to a remark on cinema and sculpture that Pomorska made to Jakobson (1983:78): "The cinema [...] tries most graphically to combine the simultaneous and the linear, and this is all the more striking since the cinema combines both word and the visual image. [...] One can find an analogous phenomenon among certain sculptors of today who attempt to overcome the statics of matter itself by using sculptural means to construct a set of narrative symbols that render the flow of time."

Interestingly, Jakobson showed that two major types of aphasic language disabilities can be linked to and explained by the bipolar typology: *similarity disorder* and *contiguity disorder* (1990: 116ff.; Lodge 1977: 77-79). The similarity disorder represents an impairment of meta-linguistic operations: the inability to substitute words for other words (synonyms or antonyms), "i.e. the raw material of metaphor" (Hawkes 1972: 77). Patients who suffered from this disorder still had the capacity, however, to supply and join 'adjacent' concepts like 'fork' for 'knife' and 'smoke' for 'fire.' They heavily relied on the context, in terms of both the linguistic context, e.g. syntactic embeddedness of forms, and the extra-linguistic context, e.g. the actual speech situation (Jakobson 1990: 121). It makes sense that, as the contiguity mode was still functioning, word order and deictic expressions, which are indexical and depend on contextualization, did not cause problems. In patients with contiguity disorder, by contrast, the ability to form correct grammatical constructions is impaired:

The syntactic rules organizing words into higher units are lost. [...] Word order becomes chaotic; the ties of grammatical coordination and subordination, whether concord or government, are dissolved. As might be expected, words with purely grammatical functions, like conjunctions, prepositions, pronouns, and articles, disappear first, giving rise to the so-called telegraphic style, whereas in the case of a similarity disorder they are the most resistant. (Jakobson 1990: 126)

In essence, "[m]etaphor is alien to the similarity disorder, and metonymy to the contiguity disorder" (1990: 129). The fact that linguistic functioning is affected according to the two principles of association confirms how deeply rooted they are in the conceptual system. Additional evidence for their cognitive and structural implications comes from word production

experiments. Jakobson (1990: 129) reports on psycholinguistic tasks that bring out the difference between *positional* and *semantic* substitution strategies, also guided by similarity or contiguity. In the search for patterns of associative predilections, children were asked to respond to a noun by uttering the first word that came to mind. The reactions can be divided into responses that either substitute the stimulus ('cabin' for 'hut,' or a more metaphorical variant such as 'den' or 'burrow') or complement it. Complementation here refers to the fact that stimulus and response form a sort of construction, such as 'hut burnt out,' and thus have predicative character. In other words, the same stimulus can trigger two substitutive reactions, in which metonymical or metaphorical correspondences again lie at the heart of the matter:

The capacity of two words to replace one another is an instance of positional similarity; in addition, all these responses are linked to the stimulus by semantic similarity (or contrast). Metonymical responses to the same stimulus, such as thatch, litter, or poverty, combine and contrast the positional similarity with semantic contiguity. In manipulating these two kinds of connection (similarity and contiguity) in both their aspects (positional and semantic) — selecting, combining and ranking them—an individual exhibits his personal style, his verbal predilections and preferences. (Jakobson 1990: 129-130)

It is important to realize that these *relations* between signs (similarity / contiguity) are very different from the basic types of *operations* by which signs are formed, e.g., also those operations by which the code is used to form a message. According to Jakobson, the construction of any linguistic utterance implies two basic *operations*: The *selection* of certain linguistic entities and their *combination* into linguistic units of a higher degree of complexity (Jakobson 1990: 117). According to Saussure, these two *associative* relations are

organized in spatial terms, namely along the paradigmatic and syntagmatic axes, the first of which is assumed to be vertical and the second horizontal (Chandler 2002: 79f.): While selection evolves along the paradigmatic axis, which involves substitutable entities associated by similarity, combination is assumed to evolve along the syntagmatic axis, which involves sequences of elements associated by contiguity. Both “modes of arrangement” (Jakobson 1990: 119) reflect the structural reality of language: the former in terms of the organization of the code (items connected *in absentia*, as only one form can be chosen and overtly used), the latter in that every sign is made up of constituent signs (sentences, words, morphemes, phonemes) and serves as the context for other signs (items connected *in praesentia*). Jakobson (1990: 119) referred to this kind of semiotic contextualization in *praesentia* as “contexture,” e.g. the process by which “any linguistic unit at one and the same time serves as a context for simpler units and / or finds its own context in a more complex linguistic unit. [...C]ombination and contexture are two faces of the same operation.”

It should be noted that while some who base their work on Saussure use the terms paradigmatic and syntagmatic to cover both the operations of selection and combination as well as the relations of similarity and contiguity, Jakobson separated the two: combination, for example, can be based on similarity as well on contiguity, e.g. in poetic texts (Jakobson 1956). Similarly, selectional elements can be related not only by similarity but also by contiguity, e.g. in texts structured by metonymy (Lodge 1977). Moreover, combination may be both sequential and simultaneous. An example of the former is the sequence of phonemes in a word; an example for the latter is the

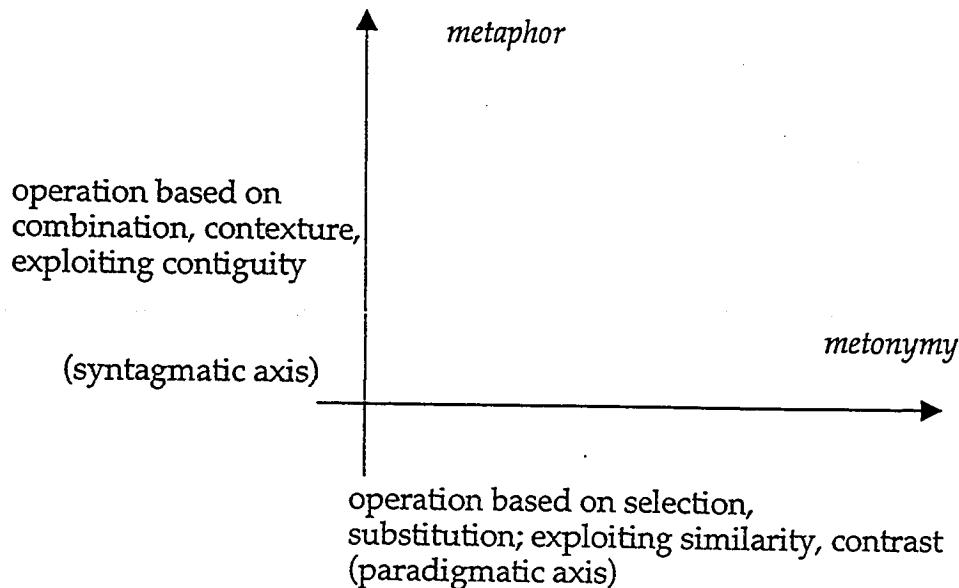
simultaneously instantiated distinctive features that form a single phoneme (Jakobson & Waugh 1979/2002). So a combination of units (*in praesentia*) can also manifest itself as a vertically-layered configuration such as a bundle of overlapping features (cf. visual representations in spectrograms). Along the same lines, Jakobson maintained, regarding the well-known notions of synchrony and diachrony, that synchrony can be viewed as dynamic and not solely as a matter of status quo in a specific point in time (Jakobson & Waugh 1979/2002: 168ff.). When looking at one particular moment, whether in respect to a speech sound, or, more broadly, in respect to language use in a speech community, there are simultaneously ongoing, coexistent phenomena to consider. Diachrony, on the other hand, consists of a sequence of countless synchronous cuts along a temporal continuum and involves not only change, but also those elements that remain static, or constant, over an extended period of time (Jakobson 1983: 57).¹⁷

Jakobson's idea of a spatial and temporal neighborhood as one type of combination/ contiguity provides an insightful way to imagine contiguity relationships (Waugh & Monville-Burston 1990: 17). Words, events, things, and actions performed by persons can be experienced as successive in time or adjacent in space (Jakobson 1983: 71). Similar interactions can be observed in gesture, where spatial contiguity interacts with temporal contiguity. Succession and simultaneity in time as manifested in spoken language are comparable to succession and closeness in space (and time) as observable in gesture. The

¹⁷ Krystyna Pomorska addresses the following question to Jakobson (1983: 70-71): "The time factor seems to take a remarkable number of forms in language. Couldn't one say that the essential creative force of language is manifest in precisely this diversity? As I recall, you emphasized more than once in your lectures that the essential power of language, and consequently the privilege of the speaker, lies in the fact that language is capable of transporting us across both time and space."

different parameters constituting the gestural sign (such as hand shape, orientation of the palm, movement, and location) combine, together with the co-occurring speech content, to evoke the meaning of a gesture which nonetheless evolves gradually in time and space. Auditory signs combined with visual gestural signs encompass both succession and simultaneity and build in their co-existence a semiotic contexture for each other (Jakobson 1987). We can thus say that gestures are the results of the operations of selection and combination, and many gestures show simultaneous/concurrent combination as well as sequentiality.

These mechanisms are also of relevance for the present study as the data consists of meta-linguistic and meta-grammatical discourse in which the construction of sentences and the spatial, syntagmatic dimensions of syntactic structure are central topics. Also, gesture space spans horizontal, vertical, and diagonal coordinates. As a matter of fact, the data exhibit examples where speakers seem to be gesturing along the vertical paradigmatic axis when listing the options among which a speaker can choose to form a noun phrase (a, the, this, ... man; proper name; etc.) and, in this case, along the horizontal syntagmatic axis when assembling words and phrases into sentences.



Schema 1: Metaphor and metonymy along vertical and horizontal axes
Adopted from Dirven (2002: 77)

Although this diagram is meant to represent Jakobson's ideas and while it does to some degree represent how linguists (language teachers and probably speakers in general) think and talk about the construction and structure of sentences, I avoid using the terms *syntagmatic* and *paradigmatic* because, in accordance with Jakobson, they stand, as we have seen above, for two very different things: operations (selection, combination) and relations (similarity/ contiguity).

1.2.2 The principle of equivalence and the poetic/aesthetic function

Even though metaphor has been identified as the master trope of poetry, and metonymy as the dominant mode in pragmatic prose, the abstract nature of grammatical phenomena suggests a high degree of metaphorical language and gesture use in the linguistics classroom. It is this potentially high degree

of metaphoric strategies that make a comparison between the two, admittedly distant genres, seem valuable. In poetry, the focus is on the sign itself. The nature of a speech event is predominantly poetic, or aesthetic, if it draws attention to its formal qualities (sound patterns, metrics, syntax, etc.), that is, if the poetic function dominates over the remaining speech functions that Jakobson identified as being at work, to various degrees, in a given message (Jakobson 1990: 76ff.; Waugh 1985: 144; Waugh & Monville-Burston 1990: 15-16).¹⁸ In this way, the poetic message does not primarily refer to something extra-linguistic, but to its own nature: "A poem provides its own 'universe of discourse.' [...] the use of equivalence relations and the resultant parallelisms and symmetries give a tight, interwoven structure to the poem and enhance its self-sufficiency" (Waugh 1985: 158). In doing so, it "systematically undermines any 'natural' or 'transparent' connection between signifier and signified, sign and object" (Hawkes 1977: 86).

Taking these observations into the context of gesture studies, we are reminded of Bouvet's (2001) remarks on the fact that the sign-referent relation

¹⁸ Jakobson introduced a schema of six factors of any given verbal message and six corresponding functions of speech events. According to this model, the following factors constitute, to various degrees, any given act of verbal communication: "The ADDRESSER sends a message to the ADDRESSEE. To be operative the message requires a CONTEXT referred to [...] graspable by the addressee, and either verbal or capable of being verbalized; a CODE fully, or at least partially, common to the addresser and the addressee (or in other words to the encoder and decoder of the message); and, finally, a CONTACT, a physical channel and psychological connection between the addresser and the addressee, enabling both of them to enter and stay in communication." (Jakobson 1960: 353). Each factor determines, in turn, a specific function of a speech event. Waugh & Monville-Burston 1990: 15/16): "Jakobson's initial insight was to define four functions of language and to show that, within the message, each function is related to one of the four factors: (1) the emotive (expressive) function corresponds to focus on the speaker; (2) the conative function, focus on the addressee; (3) the referential (cognitive) function, focus on the context; and (4) the poetic (aesthetic) function, focus on the message [...], (5) the metalingual (metalinguistic) function, corresponding to focus on the code, and (6) the phatic function, focus on the contact."

in spontaneous gesture is not to be regarded as ‘transparent,’ but rather ‘translucid,’ that is, the addressee is able to retrace the underlying semiotic relations. As part of expository discourse, representational gestures point to various factors: preceding gestural forms (staying in their own system), to the ongoing discourse (inter-semiotic translation; meta-linguistic function in a way), and to what they are supposed to represent (extra-linguistic, external world) (see section on motivation of gestural sign of this study). In view of what Waugh states below regarding language, we may say that gestures encompass both poetic and non-poetic dimensions:

Given that the bond between sign and object is brought into question, the *inner relation* between *signans* and *signatum* and between sign and sign is focused upon and strengthened. [...] In a poetic text, a word might be chosen not only because of its paradigmatic associations with other words in the linguistic code, but also by its equivalence relations with other words in the text itself. The choice of one word may dictate the rest of the poem [...]; in non-poetic discourse, the word must ‘make sense’ in terms of external factors. (Waugh 1995: 154; italics in original).

While in poetry, “the poetic function projects the principle of equivalence from the axis of selection into the axis of combination” (Jakobson 1960: 358), in meta-linguistic discourse the *principle of equivalence* seems to be at work primarily along the axis of selection, e.g. the issue is to find adequate terms to describe the nature and behavior of abstract categories and structures. In terms of genre, it is, for instance, pragmatic prose, as well as literary realism, where the focus is supposed to be primarily on the referent, and the discourse is forwarded by contiguity. “Metonymy is the line of least resistance” (Jakobson in Dirven 2002: 47); as “in non-poetic discourse, the word must

'make sense' in terms of external factors" (Waugh 1995: 154). In the language data of this study, we can thus expect that the structure of the prose is metonymic, e.g. speakers progress in the exposition of the subject matter in a linear, contiguous fashion, while using metaphors as cognitive, semantic devices to refer to abstract notions, thus pointing outside of the message text.

When using linguistic metaphors to refer to abstracta, we can observe a tendency of *distance* between the object and the result of its semiotic transformation, even if the character of technical grammatical discourse is anything but poetic. Such abstracta need to be reified and mediated in order for us to perceive them, talk about them, and put them into relation to one another, we need to find correlates that share properties with them. These correspondences then can find expression in speech, gesture, or diagrams. If there were a more direct, or natural connection between abstract subject matters and the linguistic signs we use to talk about and understand them, then there probably would not be so many competing theories with each of them having their own metaphorically-based terminologies and jargon.

As for the accompanying gesture, we can expect the referential (context, referent) function as well as the meta-linguistic (interaction with language, commenting on and complementing linguistic message) and phatic (holding the contact, i.e. attention, between addresser and addressee) functions to interact.

1.2.3 Comparative semiotics: A look at Cubist and gestural signs

The structural and referential mechanisms described above seem to be at work in visual sign systems which include pictorial and gestural signs alike. Keeping in mind the role of the poetic function in language, which, as Jakobson put it, “promotes the palpability of signs” and “deepens the fundamental dichotomy between signs and objects (Jakobson 1960: 356), it has also been discerned in visual art (Scobie 1997; Schwarz 1997). In what follows, I will take these correspondences a step further and propose a link between Cubism and gestural signs. The goal of this endeavor is to demonstrate in what ways the semiotic characteristics of the two visual systems can illuminate one another.

1.2.3.1. Metonymy in Cubism: Ellipsis, essence, and relativity

Jakobson (1956/1990) himself showed a special interest in Cubism when illustrating his theory of metaphor and metonymy. Again, the notion of equivalence plays an important role in this context; despite the different cognitive and structural effects of these tropes, “[b]oth are figures of ‘equivalence’ in that they characteristically propose a different entity as having ‘equivalent’ status to the one that forms the main subject or figure” (Hawkes 1977: 77). Jakobson argued that certain poets as well as certain art schools exhibit a tendency for either the metonymic or metaphoric style: Cubism is inherently metonymic in nature (“the object is transformed in a set of synecdoches” Jakobson 1990: 130), whereas Surrealism, for instance, has a tendency for metaphorical symbolism (Jakobson 1990: 129ff.; Lodge 1977:

73ff.). He also claimed that not only artists, but everyone has similar associative and expressive predilections.



Figure 2: George Braque, Young Girl with Guitar, 1913

When looking at a Cubist painting as the one above (*Young Girl with Guitar*, 1913, by Georges Braque), one is immediately under the impression of a mass of geometrical forms and planes that are represented and composed in a non-transparent way. In order to figure out the depicted objects, i.e. the visual semantics, the viewer has to make cognitive efforts to reunite signifier and signified which have been deliberately taken apart by the artist. Even the signifier, e.g. the head of a woman or a single eye, is taken apart, and fragments are represented from different view points at the same time resulting in what has been called 'simultaneous vision' (Zeki 1999: 52).¹⁹ Neither lighting effects nor laws of central perspective are taken into consideration. It is the addressee's task to bring back together the bits and pieces of the signifier, to unify the different perspectives and to find the corresponding signified, as if she or he was completing a sort of puzzle. Viewers may reach completely different conclusions in terms of reference (without considering the title). It is thus not the realistic rendition of persons or objects (*composition after nature*, Read 1985: 83) that is at the center of attention; instead, the formal elements of the entire message sign are foregrounded.²⁰ Taking an analytic approach, the aim of Cubists was to "discover less unstable elements in the objects to be represented, i.e. the constant and essential elements" (Zeki 1999: 50). Objects are represented by an array of simple geometric solids such as cubes, squares, circles, cylinders, triangles, etc. Thereby the rules of combination and perspective seem to be defined in the very art work and not by habitual standards: "It is this self-

¹⁹ Zeki (1999: 50-56) offers a neurological interpretation of Cubist compositions.

²⁰ The referential function is crucial in visual representation, especially regarding such aspects as imitation, mimesis, abstraction, or non-representational, i.e. non-referential, art. The question is whether we can read an image because we recognize it as an imitation of reality, or whether we have difficulty doing so.

reflexive concern for its own mode of existence and representation that makes Cubism the Modernist movement par excellence in painting. Cubism was always an art of semiotics" (Scobie 1997: 79).

Cubists, especially Picasso and Braque, believed that "the essence of painting was form" (Wertenbaker 1967: 86). The principle of equivalence, and thus in a way the poetic function, is instantiated by those basic geometrical forms that function as structural devices creating a pattern within a single Cubist sign as well as across paintings. Such pictorial patterns can be compared with sound patterns, rhyme schema and metrical structure in poetry (Scobie 1997: 101). In both cases, the created effect exhibits "the promotion of a sense of 'sameness,' of pattern" (Hawkes 1977: 80). Basically all objects in a cubist composition undergo a structural transformation, a sort of geometric dissection, which is, and this is the central point here, to a high degree afforded by metonymy and synecdoche. It is exactly this technique that brings about the metonymic character of Cubist art. Objects and human figures are, as mentioned above, transposed in sets of synecdoches (Jakobson 1990: 130), decomposed into *salient* parts and features such as shapes and contours, standing in for the entire body, head, hand, guitar, table, etc. and thus demonstrating the *pars pro toto* principle which in turn relies on the mechanism of *deletion* (cf. Lodge 1977: 93):

Deletion is to combination what substitution is to selection.
 Metonymies and synecdoches are condensations of contexture. [...] Metonymy and synecdoche, in short, are produced by deleting one or more items from a natural combination, but not the items that are most natural to omit: this illogicality is equivalent to the existence of similarity and dissimilarity in metaphor. (Lodge 1977: 76)

Which elements of an entity get deleted and which take on the role of the sign (*representamen*) that stands for the whole is the artist's choice. One especially insightful example is the fact that a Cubist guitar never has all six strings (Scobie 1997: 79). At least one string is omitted, i.e. deleted, which can be read as a zero sign or an ellipsis. Attention is temporarily focused on some parts of the whole which "each perceiver has to resolve in her own hypothesis of unity, an hypothesis always challenged by the anarchy of disunity" (Schwarz 1997: 196).²¹ Besides synecdoche, there are other forms of metonymy. A newspaper can be represented by its name, again partially as in painted or pasted verbal signs such as JOU or JOUR standing for JOURNAL; a table can be suggested by a piece of the material it is made of such as the often used papier faux bois, and the like.

Cubism not only incorporated words, or just parts of words, into its compositions, its pictorial signs also exhibited characteristics central to language, and, seen from a wider perspective, also central to semiosis. Reductivity and relativity in signs are two of them. A tendency of reduction is visible in regard to genres, objects, colors, form repertoire, as well as the sign itself. The three-dimensional natural world is reduced to a two-dimensional canvas. Landscapes, still lifes, and portraiture are all abstracted to the elemental forms of geometry, revealing the essential characteristics of any referent. This highlights the fact that a sign always stands for its object only in certain respects.

²¹ Jakobson describes this cognitive challenge when illustrating a case of aphasic similarity disorder. The Russian poet Uspenskij suffered from this language disturbance, and it could be shown that he had "a penchant for metonymy and especially for synecdoche and that he carried it so far that 'the reader is crushed by the multiplicity of detail unloaded on him in a limited verbal space, and is physically unable to grasp the whole, so that the portrait is often lost'" (Jakobson 1990: 132, citing Anatolij Kamegulov (1930)).

[To] come back to the missing sixth string of Cubists guitars: it declares unobtrusively but perhaps more appositely than any other visual convention, the condition of the signs as the absence of the referent. The gap where the sixth string should be maintains the distance of the sign, and ensures that the painting can only be read as a sign. (Scobie 1997: 86).

The sense of uncertainty and multiplicity evoked by a Cubist composition resides not only in this kind of reductivity, but also in the **relativity** of each sign. As a result of this, "Picasso's reduction of his plastic system to a handful of signs, non-referring univocally to a referent, causes their value to meet with numerous significations" Scobie 1997: 88). A certain curved line can stand for the bodily contours of a violin or a woman, a cylinder could represent an eye in one place of the picture and a mouth somewhere else, each time depending on the semiotic contexture (cf. Scobie 1997: 88). Mobility and ambiguity are at the base of the function of the Cubist sign, just as it is the case with linguistic signs that take on different meanings depending on the linguistic and extra-linguistic environment. To some extent, we can associate the notion of "shifters" with those visual context-dependent elements, since they take on a different meaning at any moment and in any addressee (interpretants, Peirce). So polysemy is not only grounded in the picture, but also in the interpreter who checks certain possibilities (firstness, according to Peirce) before settling on the one that makes most sense for him or her (secondness, according to Peirce).²² "Multiplicity of meanings" captures the nature of the Cubist sign better than 'arbitrariness' (Scobie 1997: 88).

²²Joly (1994: 84) gives examples of what she calls "polysémie denotative" and polysémie interprétative," the latter of which can be seen as corresponding to Peirce's idea of the interpretant.

Here several links to gestures and their schematic and polysemous nature can be made. Gestural representation can be regarded as similarly elliptic in that it picks out the salient, or essential, parts of an object or action, while the addressee has to mentally fill in the rest and disambiguate the possible interpretation (*elliptical perception*, Jakobson & Pomorska 1983: 71). Granting the fact that this elliptic nature reduces the degree of iconicity in gestural signs, it has the advantage of being, just as in language, highly economic: A vast amount of information can be communicated in a short period of time.

Gestural representation thus rests on a structural transformation of the (dynamic) object that is driven by metonymy or synecdoche: An attribute such as the shape, dimensions, or texture of an object designated by a gesture may stand for the object itself, or, the manner of movement displayed in gesture can stand for or complement the complex motor action referred to in a given communicative act, and so forth. Intricately linked to this are the specific formal and representational affordances (Kress) of the gesture medium that are different from those of any other medium. They are conditioned, and limited, by the articulators (fingers, palms, arms, face, body), as well as by time and space coordinates. Being aware of these issues, gesture researchers are in the process of establishing a canon of basic gestural forms, or morphemes, and have already built a stock of emblems (Posner & Müller 2004, Kendon 2004, McNeill 1992; the collection of hand shapes and finger/palm orientations in the database of this study is also an attempt to account for reoccurring signifiers).

Another parallel between Cubism and gesture lies in the fact that the reduced character of forms goes hand in hand with their relativity, e.g. mobility. A curved, horizontally oriented line traced by a hand can theoretically signify, for instance, the contours of a violin, a woman's body, a mountain range, or it can imitate an intonation contour. Accordingly, the meaning of a gesture is a function of the linguistic information it coincides with as well as the immediately preceding and ensuing gestures (contexture) and the location (in relation to the body and in gesture space) where it is produced.

In terms of perspective, the speaker-gesturer can represent alternate viewpoints: observer viewpoint, participant viewpoint, as well as the addressee's viewpoint (McNeill 1992). In the data, teachers, most often facing their audience in the classroom, take different points of view when producing gestures: they may either illustrate a sentence extending from their own left to their own right or from the students' left to the students' right. Some cognitive, perceptive flexibility is thus required on both sides of the speech and gesture event.

1.2.3.2 Contrastive strategies: Total vs. local metaphor

Going to the other end of the spectrum, Surrealism can be ascribed a metaphoric nature in the sense that "it combines objects not contiguous in nature, and selects and substitutes visual/tactic values on the principle of similarity and contrast" (Lodge 1977: 80). A surrealist sign evokes a sort of

alienation by symbolizing something that is not part of the immediate context or proximity. For example, the enormous clock faces hanging over tree branches on the beach in Salvador Dali's *The Persistence of Memory* (1931):



Figure 3: Salvador Dali, *The Persistence of Memory*, 1931

In general terms, metaphor relies on the **distance**, or **contrast**, between the two concepts brought into relation. As Lodge (1977: 113) puts it, "it tends to disrupt the line of combination with its radical strategy of substitution."

Metaphoricity –the making of comparisons—is a way of bringing together apparently dissimilar entities for the purpose of revealing resemblances and differences. It is a source of the individual imagination –developed more intensely and subtly in the artist—by which we extend our experience. (Schwarz 1997: 14/15)

Comparing this with Cubism, it becomes obvious that the elements displayed in a Cubist picture do not have a metaphoric nature as such, since they are not loaded with symbolism to refer to something completely outside of their context. The selection of elements is thus guided rather by contiguity than by similarity. In this sense they are not remote enough to appear absurd; they still can, at least as far as their evoked referents are concerned, be considered as a "bit of reality" or a "slice of life" (Lodge 1977: 109): "[E]lements within Cubist compositions guide the viewer to specific patches of recognizable reality – the shape of a simplified sign of a guitar, a bottle, an arm, a moustache" (Morley 2003: 38). Notably in Synthetic Cubism, the second phase of the movement where collages figured prominently, artists incorporated pieces of their immediate environment into their work (bits of newspapers, wallpapers, product labels, and music scores). Furthermore, there is a certain intertextuality across pictures which are about similar, mundane things, most of which obviously belong to the domain of everyday life (musical instruments, people, tables, newspapers, etc.). Commonplace objects one uses continuously thus play a crucial role in this semiotic landscape

Despite the preponderance of metonymy, metaphor does come into play in Cubism, only in a different fashion. Cubist paintings are likely to produce a certain effect of disparity in the beholder. This effect may be explained by the idea that the entire sign itself functions as a metaphor. And there is enough discrepancy between a woman or guitar in reality and its Cubist transformation in order to claim a metaphorical relationship holding between them. In cases of extreme abstraction, identification of the depicted objects

might escape the viewer completely.²³ Lodge addresses this issue in his discussion of metonymic texts as **total metaphor**:

The literary text is always metaphoric in the sense that when we interpret it, when we uncover its unity [...], we make it into a total metaphor: the text is the vehicle, the world is the tenor. [...] and we know that it is not possible for the literary artist to limit himself to merely making a cut through reality, as one might cut through a cheese, exposing its structure and texture without altering it, for the simple reason that his medium is not reality itself but signs. (Lodge 1977: 110)

As demonstrated above, what Lodge said about literary texts can be transferred to visual art and particularly to Cubism and its semiotic nature. Even though metonymies are the structural device of Cubism, the painting itself cannot be regarded as a slice of life. These observations evidence Jakobson's claim that both modes of association are not mutually exclusive, but that one of them rather dominates over the other. Even though the entire message sign can be regarded as a total metaphor, Cubism for its part is structurally closer to metonymy than it is to metaphor.

²³ In this context, Jakobson's observation regarding our tendency to reify non-objective representations in modern art is very fitting: "We observe a strong and conspicuous tendency to reify visual signs, to connect them with objects, to ascribe mimesis to such signs, and to view them as elements of an 'imitative art.' Painters of all periods have splashed blotches or spots of ink or color and tried to visualize them as faces, landscapes, or still lifes. How often broken twigs, furrows in stones or other natural bends, crooks and patches are taken for representations of things or beings. This universal, innate tendency, explains why a naïve spectator when looking at an abstract painting subconsciously assumes it to be a kind of puzzle picture and then loses his temper when unable to discover what this work 'is supposed to represent' and concludes that 'this is just a mess!'" (Jakobson 1987).

There is another type of metaphor that is relevant in regard to the data: While structural devices in a picture or discourse may be metonymic in nature, there can still be instances of local metaphor:

Apart from the fact that the metonymic text must ultimately submit to a 'metaphoric' interpretation, most such texts, certainly most realistic fiction, contain a good deal of local metaphor, in the form both of overt tropes and of submerged symbolism. [...] There are however certain controls on the use of metaphoric strategies in realistic fiction, which Jakobson's theory helps to make clear. The basic point is very simple, and has already been already touched on in connection with film-montage: it is that in the metonymic text, metaphorical substitution is in a highly sensitive relation to context or contiguity. The greater the distance (existentially, conceptually, affectively) between the tenor (which is part of the context) and the vehicle of the metaphor, the more powerful will be the semantic effect, but the greater, also, will be the disturbance to the relationships of contiguity between items in the discourse and therefore to realistic illusion. (Lodge 1977: 111/112)

These observations are valuable in the context of this study, as they show how metaphoric and metonymic mechanisms evolve and interact in a given text. Interestingly, Genette, with reference to Proust's *The Remembrance of Things Past*, argued that even if the initial trigger-mechanism of memory is metaphoric, the expansion and exploration of any given memory (though accomplished with a great display of local metaphor and simile) is essentially metonymic (Lodge 1977: 115). It seems to be important here to carefully distinguish between structural and referential devices on the one hand and different modes of sign constitution on the other.

This study is designed to shed light on how these mechanisms drive not only meta-grammatical discourse and gesture, but also sign constitution in

gesture, a living visual medium that has the potential to exemplify some of the core principles of semiosis (e.g. ellipsis, economy, creativity, etc.). On the basis of the just introduced concepts, we are now in the position to preliminarily characterize the structure of academic, expository discourse as primarily metonymic, with the use of local metaphors to refer to abstract concepts and relations (on diagrammatic iconicity in academic texts, cf. Waugh et al., Logos). At the same time, metonymically structured discourse can be interpreted, in its entirety as a total metaphor (just as the Cubist painting is a metaphor) based on a certain distance between the domain of grammatical phenomena, the (more or less) concrete substitutes, and the reality of the speech event. Meta-grammatical discourse and the source domains from which the metaphors receive their grounding do "belong to different spheres of thought" (Lodge 1977: 75).

To what degree this takes place without disrupting the metonymic line of combination (Lodge 1977: 113) will be examined in this study. Aristotle describes metaphor as "midway between the unintelligible and the common place" (cited in Lodge 1977: 112-113). As demonstrated in this section, Cubist compositions seem to oscillate between these poles; in what follows, we will see in what ways linguistic and gestural illustrations of abstracta, too, tend to draw on structured yet creative mechanisms to mediate between the two. The notions of salience, synecdoche, and essence will be particularly relevant.

In the past artists represented things they had seen on earth, things they liked seeing or might have liked to see. Today they reveal the **relativity of visible things**; they express their belief that the visible is only an **isolated aspect** in relation to the universe as a whole, and

that other, **invisible** truths are the overriding factors. Things appear to assume a broader and more diversified meaning, often seeming to contradict the rational experience of yesterday. **The artist strives to express the essential character of the accidental.** (Klee 1962; bold face not in original)

1.3 Summary

To conclude this first chapter of the dissertation, I will briefly recapitulate the principal semiotic modes that are, according to Peirce and Jakobson, involved in the interpretation of signs (poetry, prose, paintings, spoken language, gestures, etc.), by offering paths of associations. For Jakobson, these processes are heavily guided by either metaphor (similarity) or metonymy (contiguity), and we have seen examples above where both modes can simultaneously be at work in one and the same message sign, securing reference and/or structure. The table below brings together Peirce's and Jakobson's categories, and represents (in relatively broad strokes) the levels of interpretation discussed so far.

The best way to read the table is bottom-up, starting with the lowest level (physical and social context) which is not as such part of either theory, but deserves inclusion to account for the foundation on which semiotic acts take place. The levels 'above ground' follow Peirce's triad of *firstness*, *secondness*, and *thirdness*, each time indicating the corresponding facets of the sign process and how they may be instantiated in gestural signs. The example referred to in the table is one of the gestures most frequently encountered in the data of this study: the object/box gesture already mentioned above. To

recall the content of the sequence, please see the transcript provided below.
The focus here is on the first gesture (G1), represented in the ensuing drawing.

VIDEO #1

(1) *grammar is not a thing*

... maybe a too radical departure for you from the normal way of looking at how grammar is acquired

G1
object/box, bh
but it does not see [grammar as a **thing**}
]
G2
fists, bh
[that you get]
G3
bh rotating
[and then u=se]

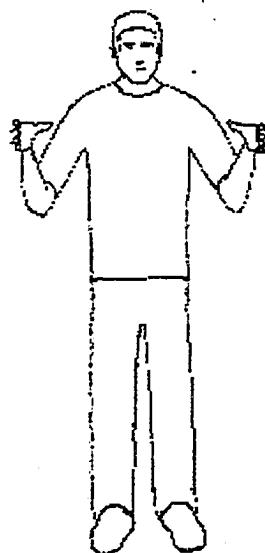


Figure 4: Grammar as object (G1)

In the table, Jakobson's notions (conceptual relations and operations) appear on top of Peirce's domains of firstness, secondness, and thirdness, and it still needs to be determined how exactly these notions can be integrated into the three domains, especially with regard to the semiotic modes at work in gestural communication. Some of these issues will be discussed in the following part, where the methodological approach to the data will be laid out. However, the exact relationship between the modes of iconicity and indexicality, as well as points of overlap between the traditional semiotic approaches discussed above and contemporary theories of metaphor and metonymy will be treated and illustrated in chapters III, IV, and V.

Table 1: Different levels of description/interpretation [Peirce/Jakobson]
 (to be read from bottom to top)

Jakobson: modes of association / meaning-making

conceptual relations: metaphor & metonymy (similarity (iconicity), indexicality (contiguity))
conceptual operations: selection of single signs & combination of several aphasic disorders:
 contiguity disorder (loss of metonymy); similarity disorder (loss of metaphor)

metaphor	(similarity / contrast / distance) as principal mode in surrealism
metonymy	(concreteness / contexture) as structuring device in cubism

example: concrete object gesture is selected to stand, metaphorically, for abstract entity

thirdness

Peirce: sign-interpretant relation; interpretation	[SYMBOL] [METAPHOR]
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patterns of gestural features (habituation / codification for emblems)
 differences and commonalities in terms of speech events, speakers, contexts, cultures

example: across/within speakers this 'object/box' gesture occurs repeatedly when referring to abstract entities;
 => tendencies to exploit certain metaphors (parallelisms) for abstract concepts & structures

secondness

Peirce: object-sign relation; representation	[INDEX] [DIAGRAM]
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salient features in gestural sign actually act as sign, standing for something else:
 What does sign refer to in a particular instantiation / utterance?
 local reference and meaning (plus concurrent speech)

example: the two hands seem to be holding an imaginary object between them, object refers to something concrete (icon) or abstract (metaphor), depending on speech content

firstness

Peirce: characteristics of the material sign; grounding / presentation / abduction
[ICON] [IMAGE]

gesture sign qualities / physical features of sign (hand shapes, movements, location, etc.)

example: two open hands shoulder-wide apart, palms facing each other

physical and social context: interaction with interlocutor/audience;
 interaction with material anchors / physical surroundings / situatedness in space

CHAPTER TWO

METHODOLOGY FOR MULTIMODALITY: DATA, TRANSCRIPTION, CODING SCHEME, AND ANALYTICAL APPARATUS

In this chapter, I will present the empirical steps involved in the collection, documentation, and analysis of multimodal data consisting of spontaneous speech and its accompanying gestures. It is important to realize that the method developed for this dissertation represents only one way of transcribing, coding, and analyzing co-speech gesture. Throughout this chapter, I will point to the research that has inspired the approach taken here and also show how this work positions itself in relation to the dominant strands in gesture research. Even though the methodology has already been adjusted and refined a number of times, it can still benefit from adjustments based on what has worked well and what still calls for reconsideration.

2.1 Options and choices regarding context, genre, subject matter, and data type

As is the case with approaches to discourse concerning only the verbal side of communication, there is to date no unified empirical method used for gesture analysis.²⁴ This lack of methodological unity can in part be explained by the

²⁴ For a concise overview of the field see Kendon (1997), for more comprehensive accounts see McNeill (1992) and the recently published monographs by Kendon (2004) and Goldin-Meadow (2003); to get an idea of recent endeavors in the field see the journal Gesture (edited by Adam Kendon and Cornelia Müller) and the website of International Society for Gesture Studies: <http://research.communication.utexas.edu/isgs/>.

fact that gesture researchers come from a variety of disciplines with their own prominent research questions and methodological traditions: psychology, anthropology, linguistics, human development, communication, etc. From a psycholinguistic perspective, the field has primarily been shaped by McNeill's (1992, 2000) and Goldin-Meadow's (2003) pioneering work on both analytical methods and our understanding of the interplay between cognition, human development, language, gesture, and communication. Goodwin's (1981, 1993, 2001), Kendon's (1990, 1995, 2004) and Streeck's work (1993, 1994) has been ground-breaking for gesture studies within cultural anthropology and conversation analysis. Other influential work includes M. Goodwin's (1990) and Scollon's and Ochs et al. (1996) contributions to a better understanding of the interplay of language, gesture, gaze, and other not strictly linguistic components of human communication in interaction.

This study has particularly been inspired by the methods of transcription, coding, and analysis developed by members of the McNeill Lab at the University of Chicago, Cornelia Müller (1998, 2004a) at the Freie Universität Berlin, and Rebecca Webb (1996) at the University of Rochester. The corpus built for the purpose of this research comprises 24 hours of naturalistic academic discourse and co-speech gestures produced by four linguists (all native speakers of American English; three females and one male) who were videotaped during introductory linguistics courses at two major American universities. This choice of genre was motivated by an interest in conceptualizations of the domain of grammar, and also by a need to empirically evaluate claims made by proponents of cognitive metaphor theory. While working with spoken usage data has only recently become a

trend in the cognitive linguistics research community —there is comparatively more work done on written discourse (Zinken 2004; Zinken, Illsten, and Nerlich fc., and Musolf (2004), *inter alia*)— a spectrum of spoken genres are represented in gesture research which has a short but concerted history of establishing methods of analyzing spoken data.

Well-researched domains of inquiry include, among others, gesture and language development (Goldin-Meadow 2003; McNeill 1992), second language acquisition and teaching (Gullberg 1998; McCafferty 2002), conversation analysis (Goodwin, 2001 Streeck 1993, 1994), and cross-linguistic/cross-cultural investigations (Efron 1972; Kendon 2004; Müller 1998). Within these areas, some recent work has focused on the form variants and functions of one particular gesture (such as Müller's (2004) study of the palm-up open-hand gesture) or a gesture family (Kendon 2004), or culturally-dependent practices of pointing (Kita 2003). Other possibilities include micro-analyses of the close relationship between linguistic and gestural expression of ideas in an unfolding discourse (Kita 2000; McNeill & Duncan 2000; McNeill et al. 2001). Of course, decisions concerning the speech situations one wishes to examine determine not only the environment one needs to explore, but also the kind of genre the data will represent, different distributions of gesture types, and the kinds of parameters that will ultimately shape the ensuing transcription and analysis procedures. Importantly, genre and context influence discourse pragmatic factors which in turn are likely to motivate the types of gestures that might predominate over others (iconics, metaphorics, deictics, emblems, etc.; McNeill 1992). Since this work investigates the abstract

domain of grammar and linguistic theory, one can expect that metaphorical gestures will be the dominant semiotic mode.

A look at previous research attests to the tight interrelation of these factors (subject matter, genres, context, communicative behavior, etc.) and illuminates the ways in which they are linked to different methods of eliciting and collecting multimodal data. One can broadly distinguish between naturalistic environments (e.g., authentic talk-in-interaction), experimental conditions, and quasi-experimental conditions. I will briefly discuss these methods in order to point to the options I chose from when designing this study and also to highlight the degree to which this study differs from other work on gesture.

Developing their own quasi-experimental method of data elicitation, McNeill and colleagues based a significant portion of their investigations on visual stimuli, e.g., films and animated cartoons (such as "Canary Row" (seven minutes long); see McNeill 1992, 2000; McNeill & Levy 1982). Immediately after watching the film, participants are asked to recount the story from memory to a listener. This kind of storytelling technique, based on the same visual stimulus (without much verbal content) for all participants, has several advantages: it can be used with speakers of different age groups, including children, speakers of different languages, etc. It also provides a common denominator in terms of semantic content, sequence of events, and narrative structure. This work has especially shed light on iconic gestures which render the speakers' mental images of concrete objects, actions, and settings as they were seen in the cartoon. Being aware of what the participants

try to convey in words and gestural imagery, the researcher does not rely exclusively on the speech content to determine the meaning of a gesture. Moreover, she can identify patterns within and across the different renditions of a single scene. When comparing narrations performed in different languages, this sort of data allows one to discern tendencies in the distribution of semantic features across modalities, thus revealing aspects of information management and how gestural action (achieved by particular gesture types) seems to be intertwined with the phrasal organization of the concurrent speech (see also Kendon, 2004: 113). For instance, there is interesting work on the manner in which the various semantic aspects of complex motion events (involving direction and / or manner) are encoded in speech and / or gesture. This kind of work has yielded insights into typological differences evident within both modalities (cf. Duncan 2003 on verbal aspect and Kita & Ozyürek 2003; McNeill & Duncan 2000; Müller 1998 on gesture research illuminating what Slobin (1996) termed 'thinking-for-speaking' and the difference between verb-framed vs. satellite-framed languages (Talmy 1983, 1988, 2000)).

Narratives elicited in quasi-experimental settings as the one described above are an especially well-represented genre in gesture research. Such set-ups allow for the control of environmental factors such as the physical setting and participant constellation; the participants are typically asked to sit down in a chair in front of a dark uni-colored background so that arm and hand movements can be easily discerned when analyzing the video data. There is also a fair amount of work done on conversational data (Sweetser 2003 (Berkeley Gesture Group); Müller 1998, 2004; Streeck 1993; Kendon 2004; Tabensky 2001). Except for an increase in speaker number, the set-up can be

similar to the one just described, in that the interlocutors sit down and do not move around. Different dynamics can be identified in small group discussions centered around situated cognitive activities such as solving math problems (Goldin-Meadow 2003; McNeill 1992; Nuñez 2004; Smith 2003), reviewing architectural models (Le Baron & Streeck, 2000), or in science classrooms (Kress et al. 2001; Ochs et al. 1996; Roth 2003). Again, other genres encompass, among other things, instructions/expert-laymen exchanges (Furuyama, 2000; Haviland 2000; Streeck 2002). There are also studies based on monologic, expository prose such as talks and lectures about specific topics (Sweetser 1998; Parrill & Sweetser 2004) which are, compared to the present study, similar in terms of content and genre, but not necessarily similar in terms of the actions the speaker performs while speaking. For example, many, but not all, teachers tend to move around in the classroom while speaking.

In this study, the focus is on the teacher lecturing, and not on teacher-student interaction, which would certainly be a fruitful next step of inquiry. The reason for choosing this focus comes from the realization that for an initial study of metaphors and metonymies in representational gestures of grammar, it would suffice (and be already a complex enterprise) to analyze the teachers' discourse and gestures. Introductory courses seemed to be the right level, as teachers could be expected to make pedagogical efforts when introducing new technical terms, concepts, and theories. Also, the courses were selected such that the data would cover, besides general grammatical phenomena, several views of grammar and linguistic theory: Generative Grammar, Emergent Grammar (in the context of teaching second languages), and Relational Grammar. Since linguistic theories are themselves built on specific sets of

metaphors, and since gestures are assumed to depict aspects of the source domains of metaphorical mappings, I was interested in finding out to what extent the theoretical framework talked about in a given instance would influence the kinds of gestures produced to illustrate the linguistic explanations. When asking the subjects for permission to videotape their lectures, the purpose of the study was framed in very general terms and the fact that gesture was of interest was not revealed so that the speakers would talk and act as naturally as possible.

In teaching contexts, speakers usually move about the classroom, write on blackboards, whiteboards, or overhead transparencies, point to information on boards and screens, interact with the audience by turning and/or walking towards students who ask questions, and so forth. Obviously, factors such as the physical environment, the location of the speaker vis-à-vis the student audience, and the use of artifacts determined how the video camera was set up in order to ensure that all the physical elements, and especially the speaker's gestures, were captured as completely as possible. It took some practicing to follow the subjects with the camera at a speed comfortable to the eye and to use the zoom function in a way that the speaker would be more or less at the center of the screen. The video camera was mounted on a tripod placed in the back of the classroom, usually in the middle of the back wall. Each lesson was videotaped in its entirety, and notes regarding the topics treated in the course of each lecture were taken. The following technical equipment was used for data collection: a digital camera (Sony Handycam DCR-TRV900 NTSC), a tripod, and tapes (mini DV cassettes). No external mikes were used.

2.2 Assessing and editing of the video data

There were several steps involved in assessing and editing the video data.

Initially, the data were viewed several times in order to get an idea of the idiosyncracies of each speaker's linguistic and gestural expression, the general speech content (morphology, syntax, etc.), and the use of tools in the environment (overhead, blackboard, overhead markers, pointers, etc.). For purposes of documentation, a tape content log with information about what each tape contained was kept.

After preliminary data screening, the data were approached from a thematic/conceptual point of view, selecting episodes in which representational gestures of grammatical phenomena occur. Here imagistic (iconic and metaphoric) gestures had to be distinguished from non-imagistic gestures (e.g., beats; cf. McNeill (1992: 81ff.)). The goal was to determine how speakers linguistically and gesturally represented particular linguistic units (morphemes, words, phrases, etc.), categories (verb classes, semantic roles, etc.), and structures (clauses, sentences, etc.), as well as syntactic operations (active-passive transformation, subordination, reiteration, etc.).

The software used to edit the video material was the professional editing program FinalCutPro (designed for Apple Macintosh computers). After marking the starting and exit time code of each segment, the selected sequences were cut, captured, and saved as separate files (altogether approximately 120 clips). Each clip was named according to the speaker and grammatical point talked about in the segment. Working with single files had

the advantage that copies could easily be made, and that the clips could then be categorized according to speaker, content, gesture type, underlying metaphorical concept, and so forth. In order to facilitate data access, all clips (converted to iMovie files) were made available online through the Cornell Language Resource Center.²⁵

2.3 Discourse Transcription

"Discourse transcription can be defined as the process of creating a written representation of a speech event as to make it accessible to discourse research" (Du Bois et al. 1993: 45). There are various established transcription conventions developed by discourse linguists to choose from (Du Bois et al. 1993; Cameron 2001; Atkinson & Heritage 1984; Edwards & Lampert 1993; Jaworski & Coupland 1999). Here, the outline of discourse transcription provided by Du Bois and colleagues (Du Bois et al. 1993) was adopted. The reasons for using this convention over one of the alternatives were that the investigator had previously used it to transcribe speech events and because it is widely used by conversation analysts and gesture researchers (e.g., the McNeill lab). The transcription system was then adjusted according to the kind of information in addition to the speech content that was of interest (pauses, intonation, lengthening, non-vocal noises, etc.) and the kind of information that did not seem to be relevant (e.g., detailed information on primary and secondary pitch).

²⁵ URL: <http://lrc.cornell.edu/medialib/experimental/Irene/diss> The data collection is password-protected. To view the clips, please use the enclosed CD (the clips are numbered according to the order in which they are discussed in the in dissertation). I wish to thank Richard Feldman and Andrew Page for invaluable technical support and help.

When it came to deciding which transcription method to use, and how to modify it, one of the central questions concerned the degree of detail with which to account for what is going on in the data. Generally, one distinguishes between broad and narrow transcriptions. According to Du Bois et al. (1993: 46), broad transcriptions usually contain the following types of information: topic of a segment, speaker labels, time stamp of at least the beginning of the segment, and the words spoken (including all truncated words, false starts, self-repair, and vocalizations such as *um*, *mhm*, *uh*, *oh*, etc.). The stream of speech gets decomposed into intonation units when working with conversational data, the speakers' turns, as well as speech overlap, need to be indicated. Broad transcriptions additionally include intonation contour information (pitch direction, such as rising and/or falling), hesitations, laughter, pauses, truncated words, and uncertain hearings. In a *narrow* transcription, the transcriber also includes notations of breathing, accent, prosodic lengthening, tone, and other vocal noises.

Before looking at a sample transcript from the corpus, it should be mentioned that only the selected speech/gesture segments were transcribed, and that all transcriptions were conducted and/or verified by two transcribers.²⁶ Each clip was first viewed/listened to in its entirety to get an impression of what was talked about and what actions were performed. The next step then was to listen to the sequence very carefully a few times and write down the utterance word by word. This was first done without much attention to internal structure and prosody. Subsequently, however, intonation contours were identified in order to divide the stream of speech

²⁶ I thank Nick Hindy for help with transcribing the audio data.

into single intonation units (cf. Chafe 1987, 1994, 1998; Du Bois et al. 1993). The transcript provided below represents only the verbal part of a short sequence, in which the speaker explains the fact that there are, from an Emergent Grammar point of view, no a priori grammatical categories; rather, linguistic form is shaped by discourse function.

((N/V can be both in discourse))

... Therefore, _

you can't a priori for instance, _

defi=ne, \

(...) even a *noun* from a *verb*, \

(...) because, \

(..) verbs becomin- become nouns,

(..) and nouns can become verbs, /

(..) depending on how

they are *used* in the *discourse*... \

Below is a list with the notational conventions used in the discourse transcripts (adapted from Du Bois et al. 1993). The information presented in the list roughly reflects the different steps that went into creating the audio transcripts.

Intonation units:

- Each intonation unit appears on a separate line
- Truncated intonation units show a double hyphen at the place where the speaker breaks off the intonation unit before completing its projected contour: --
- Truncated words (end of projected word remains unuttered) within intonation units show a single hyphen: -
- Transitional continuity of an intonation unit is continuing: ,
- Falling terminal pitch movement in an intonation unit: \
- Rising terminal pitch movement in an intonation unit: /
- The direction of the terminal pitch movement is level: -

Pauses:

- short unfilled pause: (..)
- medium unfilled pause: (...)
- Long unfilled pause indicating duration in minutes and seconds: (... .5)
- The sound quality of a filled pause is indicated in round brackets: (ehm)

Vocal noises:

- The symbol for laughter is: @ (one symbol for each syllable of the laughter)

Stress and prosodic lengthening:

- A stressed word or a sequence of stressed words are highlighted in *italics*
- Preceding segment is lengthened prosodically: "defi=*ne*"

Unintelligible speech:

- A pair of angle brackets filled with the capital letter X: <XXXXX>

2.4 Representation of speech-gesture synchrony

The accurate description of human behavior and social action is admittedly a challenge, and one might wonder whether verbal descriptions are an adequate means of representing visual information and communication. Finding a systematic way to document the dynamics of body motion and actions, unfolding in space and time, is already a difficult task. Integrating information on gesture movements with the concurrent speech, prosody and other paralinguistic aspects of talk is even more complex. Gesture researchers, among others, have suggested various schemes for how to graphically capture not only the close temporal relationship between speech and co-speech gesture, but also the kinesic features of gestures (cf. Calbris 1990; Duranti 1997: 144-154; Kendon 2004; McNeill 1992, chapt. 3, appendix; McNeill et al. 2001; Müller 1998: 175-199, 284ff.; Parrill & Sweetser 2004; *inter alia*). In such comprehensive transcripts, the course of gestural movements (onset, peak, duration, hold, end, etc.) gets translated into (typo)graphic representations, superposed on the written speech transcript (in form of brackets, different font sizes, highlighting, underlining, glosses, etc.).²⁷

²⁷ This process becomes even more intricate if the researcher tries to account for the repeated occurrence of a specific gesture throughout a longer stretch of discourse, thus identifying gestural patterns of anaphoric reference (cf. McNeill & Duncan 2000; McNeill et al. 2001; Müller 1998).

To arrive at a fine-tuned analysis of the video data, a navigating device (ShuttlePro, a tool for video and audio editing) was used to ensure easy movement back and forth in slow motion, even frame-by-frame, to determine where exactly a gesture unfolds in relation to the concurrent speech. It should be noted that throughout the multi-layered process of annotation and analysis, there is a danger of mixing the domain of form and the domain of meaning. Therefore, special care was taken to keep the description of what one actually observes with the naked eye (hand shapes, movements, use of space) separate from what these physical qualities may represent in a semantic/pragmatic sense in a given instance.

The next step in the gesture coding procedure consisted of accounting for the exact mechanics of speech-gesture synchrony. In view of the focus of this study, the task was to annotate representational gestures articulated with hands and arms (referential gestures, according to Müller's (1998) paradigm of gesture functions), and leave aside other types of gestures, as well as facial expressions and movements of the head and torso. Due to the fluid nature of gestural movements, and their tendency to meld into one another, it was not always easy to determine the boundaries between single gesture actions — that is, to trace a gesture from the moment the articulators (here hands/arms) begin to depart from a position of rest or relaxation until the moment when they return to rest. Such a full movement excursion (Kendon 2004: 111) is called a gesture-unit (G-unit): "The G-unit is defined as the period of time between successive rests of the limbs; a G-unit begins the moment the limb begins to move and ends when it has reached a rest position again" (McNeill 1992: 83).

In the process of annotation, the goal is to find the exact moments in speech, i.e., the linguistic segments (such as syllables, words, or phrases) on which a gesture starts to unfold (the so-called “preparation”), manifests its peak of effort and clearest shape (the “stroke”), possibly exhibits a sort of hold (the “post-stroke hold”), and then finally comes back to a relaxed position (“retraction”). These different movement phases make up a gesture phrase (“G-phrase”): “The G-phrase occurs within a G-unit (several G-phrases may cluster together within one G-unit). A G-phrase in turn consists of one or more movement phases (preparation, various holds, stroke, retraction)” (McNeill 1992: 83). Importantly, the stroke (if applicable, together with the post-stroke hold) usually carries the major part of the meaning of a gesture, and is the obligatory component of a gesture phrase; some of the other types of phases mentioned above are optional (cf. McNeill 1992: 83f.; Kendon 2004, chapt. 7). As one can imagine, the broad spectrum of gestural actions and their (more or less well-articulated) execution cannot easily be accounted for, and there are always hand movements that defy segmentation and classification. For the purpose of this study, the perspective on the data targets figurative expressions (gestural imagery and spatial representations) and not more fine-grained issues like prosody or second-by-second synchrony of linguistic and gestural expression (as, for example, McNeill et al. 2001 demonstrate).

In the transcript, a gesture-phrase is represented as follows:

- The linguistic segments that co-occur with a gesture phrase are set off by [square brackets]. Each gesture is assigned an identification number.

- The syllable/word/words on which the **stroke** of the gesture falls is marked in **bold** type face. If not otherwise stated, the preparation phase is understood as the movement leading up to the stroke (i.e., from the onset of the gesture (opening square bracket) until the stroke itself (word(s) marked in bold); the retraction phase is understood as the movement between the end of the stroke phase (be it punctual, held, or continued (cf. Müller 1998: 286f. for more variants)) and the rest position (closing square bracket).
- The duration of a gesture hold (cessation of movement while preserving form and location) is indicated by underlining the co-occurring speech segments. Differences in the execution of hold phases may be captured as follows: solid underline indicates no incorporated movement; dotted underline indicates some movement such as superimposed beats.

The transcript below exemplifies these gesture annotation conventions. In the sequence represented here, the speaker demonstrates the word order change implied in transforming an active sentence into a passive by referring to the subject-object inversion as a 'flip-flop.' She produces a gesture starting out with both forearms held vertically and aligned with the shoulders, palms facing her body and fingertips pointing straight up. Then she crosses her arms over to illustrate the idea of switching elements around (G1, see Figure 1). The gestures are numerated, and glosses provide a very brief description of each gesture (abbreviations used below: bh = both hands, pcoh = palms facing center, open hands).



(2) ((flip-flop passive))

G1

bh & arms vertical, cross-over

[The passive basically flipflops _

G1 being held

the subject and object of the sentence, \a=nd _

G1 still being held

(...) what we find out by forming this particular passive], _

G2

a b

c

bh, pcoh-box, object gesture – held, move up and down

is [that the string 'John's sister' forms a constituent, \

d

e

still held, move up and down

namely the object of the verb, \

f

still held, move up and down

(..) and that's an object noun phrase] in fact. \

As one can see, this example contains two different types of gesture hold. Whereas the forearms in the first gesture (G1) are being held in the cross position over a considerable stretch of speech without inbuilt movements (solid underline), the second gesture (G2) – representing an object seemingly held between two hands — has superimposed movements (dotted underline; each beat is marked by a letter (a-f)).

2.5 Physical gesture features / coding parameters

After focusing on aspects of gesture-speech synchrony and the internal structure of gesture units, I will now turn to the issue of how to document the physical features of gestural communication. In the gesture literature, the principal and most widely used coding parameters are: hand presence/dominance (left and/or right hand), hand shape, palm orientation, movement (trajectory and type), and the location in gesture space where a gesture is performed. In what follows, I will present some of the considerations that went into deciding which features to account for and how to deal with each of the parameters. In order to describe a global gestural shape/movement, it needs, if possible, to be broken down into its components. As we will see, it is more important to determine the salient features of a gesture, that is, those features that significantly contribute to the meaning of the gesture, than it is to account for all the different parts that are observable. This observation corresponds to Peirce's understanding of the ground of a representamen (as introduced in chapter 1), that is, those qualities of a representamen that actually act as a sign in a specific event.

2.5.1 Hand Shape

Many gesture researchers use ASL signs to categorize and represent hand shapes in co-speech gesture, being aware that ASL shapes can only be approximated by spontaneous gestures (McNeill, 1992: 86-88; Webb, 1996). Similarly, in the case of this study, it seemed difficult to match relatively loose hand shapes with clearly defined ASL signs. An alternative, it seemed to me, was to search the data for prominent hand shapes and movement patterns, thus trying to establish a data-driven typology of manual signs. The next challenge was to think of names, or linguistic labels, for the various hand shapes—names that were concrete/iconic enough to make communicating about them easy, but not too suggestive of their possible interpretations. Here it seemed useful to build on conventions introduced in previous work on specific hand shapes such as Müller's (2004a) study of forms and functions of the palm-up open-hand gesture (puoh).²⁸

The following list represents some of the different open-hand variants found in the data. Each type was assigned an abbreviation referring to the openness and orientation of the palm (such as puoh) plus a 'name' and an indication of which hand was used.²⁹

²⁸ See Müller (2004) for a discussion of previous accounts of this gesture type and a detailed account of its different forms and functions.

²⁹ I wish to thank Allegra Giovine, Daniel Sternberg, and Joel Ossher for their invaluable help with data analysis and data base design and also for all the fruitful discussions we had on the nature of gesture and the challenges as to how to get a grasp of them.

Single hand / open hand variants:

puoh: palm-up open hand; rh: right hand; lh: left hand; bh: both hands

- A. puoh-tray-lh/rh/bh hand as flat surface, supporting imaginary objects
- B. puoh-cup-lh/rh/bh hand with curled fingers, forming a receptacle
- C. pföh-stop-lh/rh/bh [“f” stands for “front,” meaning palm faces audience]
- D. pdoh-lid-lh/rh/bh [“d” stands for “down,” flat hand]
- E. pdoh-claw-lh/rh/bh [open hand facing down, fingers curled]

These gesture categories are already listed here to provide a first impression of how the data were exploited and also to set the stage for the ensuing discussion of theoretical issues of iconicity and metaphor and their instantiation in the data (chapters IV and V).

2.5.2 Location in gesture space

For the purpose of documenting the location where gestures are produced and gestural movements evolve in gesture space, virtual grids have been developed by gesture researchers to visualize and compartmentalize the space a speaker makes use of for manual expression. The range and organization of space a speaker utilizes is conditioned by factors such as age (children vs. adults), cultural background, personal style, and subject matter. It should be noticed that the location of a gesture can be described from various angles: relative to the gesturer’s body, to other gestures, or to the addressee’s gesture

space. While the system McNeill (1992:86-89) proposed shows a grid of concentric squares superimposed on a drawing of a seated person (reflecting the experimental set-up described earlier), it seemed necessary to design a gesture model that stands up (see drawing below) in order to account for the teaching context. The highlighted square designates the location where a particular gesture may be produced.

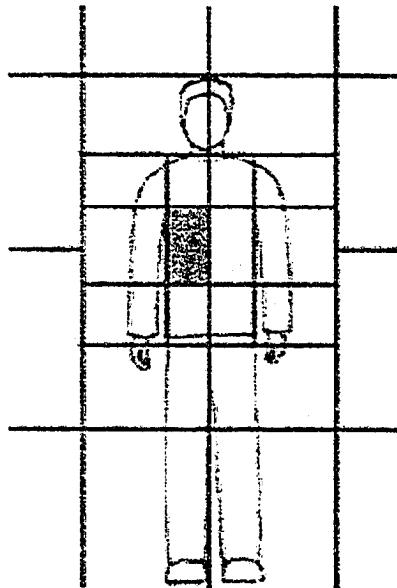


Figure 5: Grid system to account for the location of a gesture

The following graphic offers a side view representing the depth of gestural movements in relation to the body. The dimension of depth is still under-investigated, and despite initial plans, it will not be considered much here, either. This is one of the concessions that needed to be made, realizing that it is impossible to devote equal attention to all the facets of gestural representation and expression.

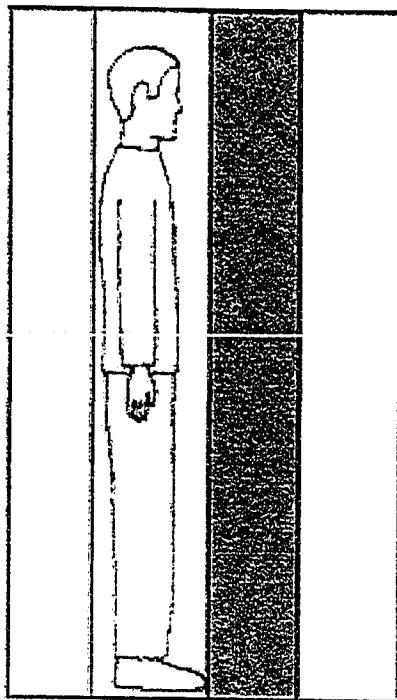


Figure 6: Side view showing depth of gesture space

Space is the medium in which gestures evolve and find expression. Yet, gesture space is not absolute. Rather it is relative to, and constituted by, the position and posture of the speaker/gesturer who, in each communicative instance, sets up the dimensions of gesture space around her, according to the dimensions of her body, her gestural articulators, and, if applicable, also according to the interpersonal space between herself and her interlocutor(s). Not surprisingly, the space parameter has entered gesture research in various ways. Here, too, choices regarding the present study were made by considering previous research.

For instance, some gesture researchers have examined the relative density of gestural occurrence in the different sectors of gesture space, thus discerning which gesture types tend to occur close to which body parts (head, chest, etc.), in the center versus the periphery, or on upper vs. lower planes. Such investigations reported on in McNeill (1992: 88) suggest that there is a correlation between the type of gesture performed and the sector(s) of space in which it occurred. In narratives produced by American university students, iconic gestures were predominately performed in the immediate center, metaphoric gestures in the lower center, and pointing gestures (deictics) in the periphery. In a further step, these findings were supplemented by a frequency analysis of gesture types in correlation with different discourse contexts: narrative clauses (promoting the development of the story, that is, the plot line in terms of sequences) vs. extranarrative clauses (descriptions of the setting and characters, summaries, comments, etc.). As far as the function of certain types of gestures are concerned, McNeill (1992: 92ff.) was able to find that whereas iconic gestures and abstract pointing gestures occur primarily in narrative clauses, metaphoric gestures appear chiefly in extranarrative clauses.

Although such an analysis is not carried out in this study, these results are of relevance here, since they inform us about the locations where iconic and metaphoric gestures tend to occur in a genre that is different from the one under investigation. The relation between specific locations in gesture space and specific body parts did not appear to contribute significantly to the types of gestures examined here and was not made a central aspect of the analysis. However, I would like to point out that, in the teaching context, metaphoric gestures tend to take center stage in several respects: A) as most of the

gestures refer to the abstract domain of grammar, they can be said to be predominantly metaphoric signs (exhibiting different types of iconicity); B) they are predominantly produced in upper center, center center, and lower center gesture space; and C) explaining abstract grammatical categories, structures, and operations is the primary purpose in this kind of academic discourse. Here, one of the main interests was to determine in what ways the speakers' use of the different dimensions of gesture space can be linked to spatial metaphor, and thus to the theoretical model of sentence structure talked about in a given moment. This is, as will be shown in detail, where different diagrammatic representations of sentence structure come into play: horizontal lines extending from the left to the right of the speaker, tree diagrams (generative grammar) exploiting horizontal, vertical, and diagonal axes, etc. As we will see, such diagrams structure the space in front of the speaker by providing virtual grids in gesture space with slots where grammatical units can be placed and subsequently referred to.

2.5.3 Movement

Gestures typically involve movement through space. As opposed to the (unmarked) flux of hand movements, a gesture hold can be regarded as a marked use of gestural signs (cf. Waugh 1982 on markedness relations). An adequate description of manual actions entails the trajectory / axes of the performed movement (horizontal, vertical, diagonal, length, etc.), the type of the movement (straight line, wave, circle, rotation, etc.), and the absence / discontinuation of movement (e.g. different types of gesture hold). At the same time, one needs to keep in mind that not all of these features

contribute (equally) to the meaning of a gesture and that only a portion of the gestures examined here derive their meaning from salient movement features (as opposed to gestures in which the hand shape is more significant than the movement).

For each holistic gestural gestalt/movement it needs to be determined, in correlation with the speech content, which features contribute most significantly to its meaning. Issues of salience are thus crucial. In certain cases, the movement appears to be more salient with respect to the meaning of a gesture than with respect to the particular shape of the hand performing the movement (e.g., in certain pointing gestures); sometimes, the hand shape is more salient than the contextual movements (e.g., a precision grip gesture), and in yet other cases, both dimensions are significant (e.g., a push with palm facing the addressee). These realizations concerning meaning-making processes in gesture reflect what Jakobson called "the hierarchy of salience."

The following list provides some of the salient movement patterns found in the data:

Linear movements, along a single axis (horizontal / vertical / diagonal)

F. hori-trace-lh/rh

horizontal



G. vert-trace-lh/rh

vertical



H. diag-trace-rh

diagonal line



I. diag-trace-ll

J. diag-trace-lat

triangle (e.g. tree structures)



K. hori-join-lat	horizontal line drawn with both hands, going inward (lateral inward movement)	
L. hori-part-lat	horizontal line drawn with both hands, (lateral outward movement)	

The data were searched for instantiations of each of the identified salient shapes and movement patterns across topics and speakers, which was possible for a large portion but not all of the categories and patterns (to be illustrated in chapter V). The next step then was to discern semantic/pragmatic commonalities and differences.

2.6 Gesture Interpretation: Semiotic modes / meaning / function

Having described the formal/phonological properties of gesture movements, I will now attend to the ways in which they were classified and interpreted in terms of their semiotic (referential and pragmatic) functions. While gestures constitute a semiotic system by themselves, what a gesture refers to in a given instance always needs to be inferred in relation to the concurrent speech (McNeill 1992: 76ff.). That does not mean, however, that a gesture necessarily conveys the same semantic aspects as the speech segments it coincides with. It has been shown that spontaneous gestures can reinforce or complement what is expressed verbally (cf. Kendon 2000).

When facing the choice of either adopting a pre-existing coding scheme (for examples and overviews of the most influential paradigms cf. Kendon

2004; McNeill 1992, 2000; Müller 1998, 2004; *inter alia*) or designing one's own, custom-made scheme, it is important to realize that in a single act of gestural signification there are, as noted in the first part of the dissertation (chapters on Peirce and Jakobson), multiple semiotic modes at work (iconicity, indexicality, symbolization, etc.). Accordingly, the functional gesture categories proposed by McNeill (1992) are to be understood as not mutually exclusive; on the contrary, the different semiotic dimensions (iconicity, metaphoricity, deixis, etc.) may layer to various degrees. As mentioned above, a metaphoric gesture, referring to an abstract concept or an abstract relation, is always iconic in the sense that it depicts aspects of the source domain of the metaphorical mapping (cf. the McNeill Lab Coding Manual; see also Parrill & Sweetser 2004; Sweetser 1998; Taub 2001).³⁰

Adopting and applying the canonical gesture categories bears the risk of resulting in a limited account of these intricate mechanisms. As a matter of fact, this danger was also pointed out by McNeill and his colleagues who introduced these categories in the early nineties, but now, seeing how they were applied by other gesture researchers, stress the fact that the categories should not be taken as absolute.³¹ For the purpose of this dissertation, it thus seemed necessary to search for an alternative approach that would still consider McNeill's typology, yet provide ways to incorporate some of the transient cases of mixed semiotic modes exhibited in one and the same sign.

³⁰ One can further distinguish between iconic gestures that are performed from character viewpoint (C-VPT) from those that exhibit observer viewpoint (O-VPT), see McNeill, 1992.

³¹ These questions were intensively discussed during the theme session 'Metaphor and Gesture' (organized by Alan Cienki and Cornelia Müller) at the 2003 ICLC in Logrono, Spain.

The way I tried to find a solution was to combine a data-driven approach, determining as just described above the salient hand shapes and movement patterns with a paradigm of a finer spectrum of semiotic modes that would enable me to account for the gesture imagery in terms of the different modes of iconicity, metaphor, and metonymy. The goal was not only to examine the occurrence of salient gesture patterns across topics and speakers, but also to identify the different metaphoric and metonymic modes in the projection of these schemata onto abstract concepts and structures. Given these observations, an interpretative framework needed to be developed to accommodate the different types of iconicity, metaphor, and metonymy. The following table provides an idea of most of the principal semiotic modes identified in gesture data:

Table 2: Conceptual / Semiotic MODES
(according to Peirce/Jakobson/McNeill)

ICON

- image iconicity / image schema
- diagrammatic iconicity
- metaphor iconicity
 - = basic (metaphorical projection of image schema)
 - complex (linguistic theories)

INDEX

- concrete deixis (pointing at what?)
- abstract deixis (pointing at what?)

METONYMY (external metonymy, Jakobson)

- LOCATION-FOR-OBJECT
- LOCATION-FOR-FUNCTION
- ACTION FOR OBJECT INVOLVED IN ACTION
- PRESENTATION-FOR-PRESENTED
- etc.

SYNECDOCHE (internal metonymy, Jakobson)

- PART-FOR-WHOLE
- WHOLE-FOR-PART
- PART-FOR-PART, etc.

SYMBOL

- based on convention
- based on habituation

The scheme evidently reflects Peircean and Jakobsonian semiotic modes. The theoretical and analytical approach has in part been described in chapter I, and will be further developed and illustrated in chapters III and IV of the dissertation. It should be noted that the approach has been motivated by both theoretical interests and the empirical observations discussed in this chapter, whose goal was to draw a picture of the kinds of decisions and methodological steps involved in empirical work with multimodal usage data that have shaped the entire dissertation process.

CHAPTER THREE

ICONICITY AND METAPHOR IN LANGUAGE AND GESTURE: TRADITIONAL SEMIOTICS MEETS CONTEMPORARY METAPHOR THEORY

Iconicity is one of the core principles at work in gestural sign constitution. Hands imitate, among other things, the size and shape of concrete objects, offer representations of abstract objects, and reenact intrinsic motions of objects (Calbris 2003; McNeill 1992; Müller 1998, *inter alia*). In this section, I will first define the notion of iconicity and then present some of the most important views on how iconicity operates in language, signed languages, and gesture. Since it is not within the scope of this dissertation to provide an exhaustive account of the vast literature on issues of iconicity and arbitrariness in language (cf. Jakobson & Waugh 1979/2002; Waugh 1992, 1993, 1996), the focus will be on those aspects of linguistic iconicity that are most relevant to gestural communication as observed in the data. Given that signed languages use the same media of expression, namely hands and space, I will draw on insights from cognitive approaches to ASL (Taub 2001, S. Wilcox 2000, Wilcox 2004; S. Wilcox 2004; Wilcox & Morford fc.) and French sign language (Bouvet 1997).

In what follows, Peirce's definition of the 'icon' serves as starting point and framework in which to discuss the role iconicity plays in linguistic and manual communication. While chapter 1 gave an overview of Peirce's general theory of signs, the different modes of iconicity he proposed will be explicated

in depth in this section. The goal is to highlight the commonalities between his work, Jakobson's views (1956/1990, 1971a/b), and cognitive metaphor theory (Johnson 1989, 1992; Lakoff & Johnson 1980, 1999; Lakoff 1987, 1993; Sweetser 1990). I will demonstrate to what degree these classical and contemporary theories of semiotics and cognition share many assumptions about the nature of conceptual image schemata, iconic representation, and metaphorical projection/translation. Here I will in part base my exposition on Danaher (1998), who has convincingly put forward some of the ways in which semiotics and cognitive linguistics not only mesh but can actually cross-fertilize each other, "given that language is a cognitive system and that cognition is a semiotic system" (Danaher 1998: 171). Building on these insights, I will then go a step further and argue that the gesture modality reveals some of the crucial iconic principles that seem to be at the root of these compatible conceptions of the role of icons and metaphors (the "icon-metaphor link" as highlighted by Hiraga 1998). In the next chapter, I will further lay out my understanding of how iconicity and metonymy (or, icon and index) interact too, playing into gestural sign formation and communication by abstracting essential parts of objects which then get to stand for the entire referent. These theoretical considerations are directly motivated by the empirical results of this work, i.e. they are informed by the semiotic modes identified in the gesture data.

3.1. Modes and degrees of iconicity: Peircean and Jakobsonian perspectives

3.1.1 Defining iconicity

In general terms, iconicity refers to a sign-object relation that rests upon a natural resemblance or analogy between the form of a sign and the object or concept in the world (or perception of it) the sign refers to.

According to Peirce, “a sign may be iconic, that is, may represent its object mainly by its similarity, no matter what its mode of being” (1960: 157, 2.275). In Peirce’s semiotic, the icon belongs to the realm of *firstness*, e.g. to the realm of possibility and representative quality. Even if its object does not exist in the physical world, the icon would possess the character which renders the designated object significant, by virtue of standing for an abstract notion, for instance (Peirce 1955: 9).³² In essence, the iconic signifier, be it acoustic or visual, correlates with its object by resemblance, i.e. likeness, and has sensuous qualities that resemble those of the object; its perception excites sensations in the human mind that are analogous to the perception of the object itself (Chandler 2002: 39). Iconic signs thus stand in a directly *perceivable* relation to the object of reference, by illustratively imitating certain aspects of the object and thereby revealing similar features shared with their objects, as is the case with charts, graphs, diagrams, traffic signs, maps, musical scores, onomatopoeic words, and last but not least representational gestures depicting concrete objects and actions (*iconics* in McNeill’s typology (1992)).

³² “An *Icon* is a sign which refers to the Object that it denotes merely by virtue of characteristics of its own, and which it possesses, just the same, whether any Object exists or not” (1960, 2.247).

Highly iconic signs have a perceptive and cognitive advantage: when we can perceive the object in an iconic sign, we often feel closer to understanding and truth. Compared to symbolic signs, both iconic and indexical signs do not as much direct our attention to the act of mediation; instead, they seem to present reality more directly than the symbolic sign. Not surprisingly, the materiality of the sign determines the way in which the iconic mode is instantiated and which iconic elements find expression. To give an example, onomatopoeic words are only iconic in the phonic medium (speech), not in the graphic medium (writing) (Chandler 2002: 41). However, in other instances, the graphic medium can directly represent characteristic shapes – as is the case with Egyptian hieroglyphs and, in a different fashion of course, with gesture.

Being the basic element in Peirce's hierarchical structure of signs, the icon partakes in indices (secondness) as well as in symbols (thirdness). Peirce established sub-classes according to which different modes of similarities (firstness) can be distinguished. The three types of icons are *image*, *diagram*, and *metaphor*; they are also referred to as *hypoicons* (cf. Liszka 1996: 37):

Hypoicons may be roughly divided according to the mode of Firstness of which they partake. Those which partake of simple qualities, or First Firstness, are *images*; those which represent the relations, mainly dyadic, or so regarded, of the parts of one thing by analogous relations in their own parts, are *diagrams*; those which represent the representative character of a representamen by representing a parallelism in something else, are *metaphors*. (Peirce 1960: 157, 2.277)

Again, the crucial point is that there are no clear-cut boundaries between the different modes Peirce put forth, that is, the image (firstness) is

present in the diagram (secondness), and both image and diagram reside in metaphor (thirdness). At the same time, there are no pure icons, but an iconic sign also has indexical and symbolic (i.e. conventional) layers. Likewise, a symbol always has iconic and indexical elements.³³ The following representation illustrates the just described relative hierarchy:

Table 3: Layers of semiotic modes according to Peirce

	<i>sign-object relations</i>	<i>sub-types of the icon</i>
<i>firstness</i>	icon (similarity)	image (single icon)
<i>secondness</i>	index (contiguity)	diagram (relations)
<i>thirdness</i>	symbol (conventionalization, habit)	metaphor (parallelism)

A non-linguistic example for **image iconicity** is a painted blue flower portraying a blue flower in the real world, thus featuring original qualities such as the characteristic shape and color (i.e. the quality of 'blueness') of the depicted object. Another example would be a photograph of a landscape or a person. Classical cases regarding language are onomatopoeic words exhibiting phonological image iconicity, that is, the sound of the word (e.g., to meow) resembles the signified sound (e.g., the cry of a cat). Moreover, "[s]ound is, by its very nature, functional or semiotic and not merely phonic"

³³ "One of the most important features of Peirce's semiotic classification is his shrewd recognition that the difference between the three basic classes of signs is merely a difference in relative hierarchy. It is not the presence or absence of similarity or contiguity between the signans and signatum, not purely factual or purely imputed, habitual connection between the two constituents which underlies the division of signs into icons, indices, and symbols, but merely the predominance of one of these factors over the others. Thus the scholar refers to 'icons in which the likeness is aided by conventional rules.'" (Jakobson 1971: 349)

(Waugh 1979/2002: 265), in the sense that distinctive features such as grave/acute in the vowels (back vs. front vowels, for instance) trigger imagistic, opposite associations such as bigger/smaller, darker/brighter, etc. (Jakobson & Waugh 1979/2002: 182ff.). For what is commonly known as *sound symbolism*, Waugh (1979/2002: 266) suggests that “the term *sound iconism* would be more appropriate since there seems in this case to be an iconic (similarity) relation between sound and meaning” (italics in the original). She further demonstrates that there is a dialectic of immediate (direct/relatively iconic) and mediate (indirect/relatively symbolic) signification processes that manifest themselves in language (p. 270f.).³⁴

Diagrammatic iconicity is relational in nature, i.e., the “relations among the elements in the sign are isomorphic to relations among elements in the object” (Liszka 1996: 37). Hence the similarity expressed in such icons of relations does not need to be sensuous, but can simply reside in the organizational analogy of the spatial or temporal constellation; road maps (representing locations, directional relations and distances between places and landmarks), statistical curves, timelines, or family trees may serve as examples of such schematic representations, which also rely on conventions of representation and interpretation (Chandler 2002: 39-43; Haiman 1985a: 9ff.; Jakobson 1971: 347ff.). Diagrammatic iconicity also provides structural threads through complex linguistic signs, be they sentences or entire discourses (Johansen 2002; Waugh et al. 2004). Due to its important role in language

³⁴ “While mediacy (‘mere otherness’ and indirect signification – double articulation, duality of patterning) separates language not only from systems of animal communication but also from many other human symbolic or semiotic systems, it is supplemented by those multifunctional phonic properties which have direct signification, and it is complemented (or even superseded) by the tendency on the part of the distinctive features themselves to have immediacy” (Waugh 1979/2002: 270/271).

structure, the subject matter of the data, diagrammatic iconicity in grammar will be discussed in more detail below.

Finally, **metaphor iconicity** requires an additional step in establishing similarity: Two objects, or concepts, are brought into relation due to certain characteristics they share (concerning form, function, qualities, structure, etc.), and one concept is represented indirectly through another concept.³⁵ Metaphor is more abstract than both diagram and icon.

In what follows, I will elaborate on the two types of iconicity that are particularly important for the understanding of gestural representation as exhibited in the data of this study: diagrammatic iconicity (section 3.1.2) and metaphor iconicity (3.1.3).

3.1.2 Diagrammatic/Isomorphic Iconicity

Questioning Saussure's plea for the arbitrariness of the linguistic sign, many linguists have argued against arbitrariness as the main characteristic of the symbols that make up human language and in favor of the central role iconicity plays in linguistically relating to the content and structure of the non-linguistic world. As Waugh has argued, when studying linguistic phenomena, "we should all be aware of how language, lexicon, grammar, phonology, morphology, interpretation, and texts are shaped by the delicate balance

³⁵ "For example, 'Before he could hear the shot, he fell, his body as spilled vessel of wine.' The metaphor conveys the sense of the disposition of the body as blood flows from a wound by showing it parallel to the disposition of a spilled bottle of wine. So the metaphor is not an analogy (and hence a diagram), since it doesn't aim to show a similarity in relations between two things but to represent the representative character of one thing by means of another thing which has similarity to the first in a certain respect" (Liszka 1996: 37/38).

between these two fundamental dynamic forces of language: one toward iconicity and the other toward non-iconicity" (Waugh 1996: 277).

Although the idiosyncrasies of one modality have to be accounted for in their own right, it is useful to compare the patterns that emerge from gestural expression to the well-documented iconicity that is inherent in the lexicon, morphology, syntax, and the organization of entire texts (Bybee 1985; Givón 1985; Haiman 1980, 1985; Hiraga 1994, 1998; Landsberg 1995; Müller & Fischer 2003; Simone 1994; Waugh 1992, 1993, 1994, 1996; Waugh & Newfield 1995). These lines of research have brought about evidence that there are various degrees and different types of iconicity. Image iconicity, which has been shown to motivate form-meaning mappings in a single sign, such as an onomatopoeic word, is only one of the iconic principles residing in language.

As Jakobson (1971: 350) had most notably pointed out, diagrammatic iconicity underpins systematic arrangements of signs into units of larger complexity such as words, sentences, messages, and texts, where the relationships between the combined signifiers mirror the relationships between the things and events referred to, i.e., the signifieds (such as *Veni, vedi, vici* renders the order of Ceasar's action: 'I came, I saw, I conquered;' see also Haiman 1985). Furthermore, the structure and form inventory of a given sign system, such as a particular language, exhibits system-internal diagrammatic iconicity in terms of recurrent combinations of forms reflecting similar semantic relationships (e.g., the relation between lexical stems and grammatical morphemes). The fact that Jakobson (1971: 350f.) ascribed these

general cognitive and pragmatic principles of representation and communication the status of universal tendencies across languages (cf. Jakobson & Waugh 1979/2002; Waugh 1979/2002, 1993) is an additional argument in favor of comparing linguistic and gestural principles of signification.

Waugh's work on the **lexicon and morphology** (Waugh 1992, 1993, 1996; Jakobson & Waugh 1979/2002) has confirmed and elaborated the idea that there is in fact no clear divide between iconicity and pure conventionality. Rather, the boundaries between these phenomena are to be regarded as fuzzy, bringing about different degrees of form-meaning mappings that combine arbitrary and iconic elements in various ways.

The pairing of a given form with a given meaning in the lexicon, for example, is conventional. It has to be learned, it is closely related to socio-cultural patterns, and it is not predictable on an external basis. The question in iconicity research is in what ways iconicity is correlated with this conventional base. (Waugh 1996: 253)

What we can transfer into the context of this study is the realization that we need to look for *isomorphic iconicity* (Waugh 1992:13), which is, according to Peirce, a specific type of diagrammatic iconicity. In other words, we need to discern iconic relations across signs, which helps us recognize them as having similar formal properties and similar relations to meaning, too. Waugh illustrates Peirce's notion of diagrammatic iconicity with regard to the French diminutive suffix '-ette':

[...] diminutives are based not only on inherent qualities of sounds but also on their systematic recurrence in sets of words, on the fact that a given suffix such as -ette recurs in these words with the same meaning. Such systematic recurrences are one example of the workings of diagrammatic iconicity in language; they are based on the relation between lexical items and in particular on the fact that across words there are at the same time both recurrences of form (that is, subparts of words are formally identical) and recurrences of meaning (that is, subparts of the meanings are the same). This consistency of form-meaning relation across words is known in the linguistic literature as the principle of isomorphism, or isomorphic iconicity. (Waugh 1992: 12/13)

When studying gesture, recurring hand configurations, motion patterns and locations in gesture space thus need to be identified and investigated in terms of form-meaning patterns (considering that gestural forms are not as discrete as linguistic forms) and in terms of internal structure.

I will now turn to work on iconicity in grammar which is relevant in the context of this study as the data are about word and sentence structure.

Not only the combination of words into syntactic groups but also the combination of morphemes into words exhibits a clear-cut diagrammatic character. Both in syntax and in morphology any relation of parts and wholes agrees with Peirce's definition of diagrams and their iconic nature." (Jakobson 1971: 352)

Building on Peirce, Jakobson, Benveniste, Bolinger, and others, Haiman (1985: 9) claims that languages can be regarded as diagrams that are homologous with the concepts they represent. As stated above, a diagram is a complex iconic sign, as it includes several parts (or points) whose relationships resemble the relationships among the parts of the concept that it represents.

Correspondingly, a sentence can be viewed as a diagrammatic representation of what we wish to express: words, each of them fulfilling a specific grammatical function, are strung together according to syntactic principles. Haiman's primary contribution to the study of iconicity is his distinction between two types of diagrammatic iconicity in syntax: isomorphism and motivation.

Although linguistic signs in isolation are symbolic, the system of grammar which relates them may be diagrammatically iconic in two ways: (a) by isomorphism, a bi-unique correspondence tends to be established between *signans* and *signatum*; (b) by motivation, the structure of language directly reflects some aspect of the structure of reality. (Haiman 1980: 513)

Isomorphism here refers to a one-to-one correspondence between the *signans* and the *signatum* (a single word), and also between sets of *signantia* and sets of *signata* (a grammatical construction comprising several words) (Haiman 1980: 516). Consequently, homonymy and synonymy represent exceptions to isomorphism, a realization which shows that this kind of understanding of isomorphism is not easily compatible with spontaneous (non-symbolic) gesture where one-to-many form-meaning mappings are countless.

Motivation, on the other hand, can be compared to onomatopoetic words, and results in the direct reflection of meaning in the linearity of the linguistic sign (Saussure), for instance narrative descriptions of event sequences, which can be regarded as iconic displays of temporal succession (such as in *Veni, vedi, vici*; Haiman 1985a: 4, see also above). Other examples include the widespread

syntactic precedence of subjects over objects, and the tendency of grammaticalized markedness to be iconically motivated; that is, semantic complexities are reflected by morphological complexities for example in the case of reduplication, as well as of positive, comparative and superlative degrees of adjectives showing a gradual increase in the number of phonemes (Haiman 1980: 528ff., with recourse to Jakobson 1966; see also Waugh 1982 for influences of contextual factors on markedness relations).

One particularly interesting implication of the different factors of motivation is that there can be several competing motivations for the selection and ordering of linguistic signs, such as economy of expression and exact reference. These principles in turn interact with the built-in limitations of the medium (Haiman 1985: 237ff.).

The most obvious limitation of the medium of spoken language is that it exists only in the temporal dimension and is therefore *prima facie* incapable of directly representing symmetrical and hierarchical relationships. Saussure in his *Cours* alludes to this 'linear property of language, which excludes the possibility of saying two things at once (1969: 170), [...] (Haiman 1985a: 18)

As visual diagrams generally can represent hierarchical relationships and as gesture is a visual medium that unfolds in time and space, we may say that gesture, with its own limitations, makes it possible for a speaker to refer simultaneously to different properties of an object, an action, or a scene, by distributing semantic features across the two modes and thus jointly expressing several things at the same time.³⁶

³⁶ For instance, there is work done on the manner in which the various semantic aspects of complex motion events (involving direction and/or manner) are encoded in speech and/or

One way to adhere to the economy principle in both modalities is, for instance, to refer to the objects or concepts in question in language and to depict – in the case of complex hierarchical relationships holding among them – such spatial or social arrangement via gestural diagrams.

While ideally diagrams exhibit both of these properties [isomorphism and motivation] in abundance, their *raison d'être*, which is to simplify, makes both of these ideal properties impossible to attain. Simplification is necessary because life is short and human memory finite. It is possible because diagrams need only represent and not necessarily reproduce, reality; and it is possible because in order to do this, they need to reproduce only the essential attributes of the objects they denote. (Haiman 1985: 11)

Haiman's claim (1980: 537) that investigating iconicity in grammar will bring insights not only in the structure of thought (the primordial concern of generative syntacticians), but also in the structure of reality in which thought is grounded, makes sense with regard to gesture. Gesture takes place in the real world and imitates and incorporates it more directly, in a more immediate way, than language, hence its potential to deliver additional evidence for the theory of embodiment (see also Taub 2001).

In his work on non-arbitrary coding principles in syntax, Givón (1985) is especially interested in the functional motivation for iconic representation,

gesture. This kind of work has yielded interesting insights into typological differences evident within both modalities (cf. Duncan 2003 on verbal aspect and Kita & Oezyürek 2003, McNeill & Duncan 2000 and Müller 1998) on gesture research illuminating what Slobin (1996) termed 'thinking-for-speaking' and the difference between verb-framed vs. satellite-framed languages (Talmy 1983, 1988, 2001).

e.g. the mechanisms that encode the speaker's subjective perspective on extra-linguistic phenomena and experiences. While acknowledging the different types of diagrammatic iconicity proposed by Haiman, Givón's view is more directly based on a Peircean continuum from image to diagram to symbol, with a gradually increasing degree of abstraction, generality, and simplification (1985: 192). Givón holds that "a reasonable sense of 'iconicity' must presuppose the notion of 'isomorphism', so that an iconic code is an isomorphically constructed code" (1985: 188). At all levels of language, the author argues, there is a set of cognitive-pragmatic principles at work that shape the rise of isomorphic representation, answering the need to represent a complex reality with finite physical and neurological means within finite time.

Interestingly, Givón (1985: 193-196) illustrates the evolution of the letter 'A' from its original meaning of Semitic 'bull,' by showing the different steps involved in the gradual abstraction process from the image of a bull to the final form of the letter as it exists in the Roman alphabet. I will sketch this evolution from concrete-to-abstract representation here, because gestural depictions rely on a comparable process, the difference being that in gesture schematic representations of objects are produced ad hoc without much deliberation.

Assuming the head to be the most relevant and prototypical part of the whole organism (which represents a case of synecdoche), the first step is the deletion of the body of the animal, thus executing a "structural-communicative decision concerning the most striking visual feature of the

animal" (Givón 1985: 194). Next, details of the head features are abstracted away, leaving the contours (corresponding to the characteristic horns, ears, head-top and snout) which undergo more regularizations resulting in a triangle-like form whose prototypical spatial orientation ultimately gets inverted, too. The central point here is that there is "a gradual reduction in the number of points in the model that are isomorphic to the points in the modeled phenomenon, all the way to the minimum that still allows the relation of representation — one" (p. 195). In other words, the farther away a representation is from the iconic end of the continuum and the closer it is toward the symbolic end, the more the gestalt represented is reduced to its essential part(s), or isomorphic points, standing for the concept as a whole without representing internal patterns.³⁷ At the same time, the reduction of isomorphic points goes hand in hand with a gradual generalization of the pattern mapping the relations between the points. Such abstract patterns are indispensable, "since the requisite points by themselves do not represent the phenomenon unless arrayed in the 'right' pattern/relationship" (Givón 1985:195). In a similar vein, meta-grammatical gestures may not only exhibit single signs representing grammatical units, but also illustrate the spatial arrangement of linguistic units according to syntactic patterns.

Givón further addresses the question of how conscious a speaker might be of the iconic nature of her linguistic descriptions. When trying to grammatically map the temporal or spatial relations of objects or events, or

³⁷ "In some fundamental way, the one-point 'symbol' is just as isomorphic to the modeled phenomenon as the 2-point, 3-point or n-point 'diagram' or 'image'. However, it is iconic at the appropriate level of abstraction/generality, namely representing the most generic feature of the modeled phenomenon, its concept as a whole" (Givón 1985: 196).

when expressing cause and effect relations, speakers may be most conscious of lexical-level iconicities, and less conscious of abstract isomorphism relations that are inherent to grammar:

Iconicity is most obvious at the level of object and concept representation. It is still obvious though less so at the level of propositional semantics, which codes states and events. It is least obvious and most abstract at the level of syntax, which codes discourse-pragmatic function. (Givón 1985: 213)

At the abstract level of syntax, factors such as (perceptual) saliency, relevance, urgency, stereo-typicality, and notably economy (Haiman 1985) drive choices regarding word order, topic assignment, transitivity, foregrounding, adjacency, passivization, scope, and so forth. When striving to achieve "the maximization of iconic/isomorphic matching between code and coded" (Givón 1985: 207), one of the biggest challenges, it seems to me, is to translate relations of different sorts – conceptual, logical, social, and physical – in a linear fashion.

In this section, several views on diagrammatic iconicity in language have been discussed in light of their relevance for investigating similar principles in gesture. We have seen that isomorphic iconicity residing in the lexicon and morphology of a language can highlight its systematicity in terms of recurrent, iconic form-meaning relations across signs (Waugh 1992, 1996). It has further been proposed that language itself can be regarded as a sort of diagram of extra-linguistic reality and that isomorphism and motivation, two types of diagrammatic iconicity, are competing forces that shape syntactic

arrangements of linguistic signs while adhering to the principle of economy (Haiman 1985). It has also been pointed out that isomorphic linguistic mappings of reality presuppose both single (rather symbolic) signs referring to single entities as well as abstract (rather iconic) patterns that secure the relationships between the parts. Together they constitute the diagram, a complex iconic sign that results from a process of abstraction and generalization (Givón 1985).

Keeping in mind the arguments put forward above, and considering the fact that diagramming sentence structure is a common practice in grammar and linguistics courses, we can now come back to Jakobson (1971: 351), who insightfully explained why syntactic structure lends itself to be directly transposed into graphic representation. According to him, the "isomorphic composition of the signans and the signatum" facilitates

an exact transposition of grammatical, especially syntactic, structures into graphs. Such linguistic properties as the connectedness of linguistic entities with each other and with the initial and final limit of the sequence, the immediate neighborhood and distance, the centrality and peripherality, the symmetrical relations and the elliptic removal of single components find their close equivalence in the constitution of graphs. The literal translation of an entire syntactic system into a set of graphs permits us to detach the diagrammatic, iconic forms of relations from the strictly conventional, symbolic features of that system. (Jakobson 1971: 351)

As mentioned earlier, the data show that it is here where gesture tends to come in, allowing the graphic representation of different types of relations and translating syntactical relations from conceptual to gesture space. It needs

to be taken into account that visual representations of syntactic structure – in the form of written language or sentence diagrams -- serve as visual and conceptual blueprints for gestural diagrams which are not necessarily created on the fly but mirror conventionalized ways of schematizing sentence structure or formalizing theoretical views thereof. There is thus isomorphism between the visual representation of language structure in books, on blackboards, etc., and comparable gestural illustrations. With Jakobson's view in mind, we may say that gesture gives a literal translation of syntactic structures, for example by drawing a horizontal line from the left of the speaker to the right of the speaker, thus representing the extension of a sentence. Spontaneous representational gestures are not as symbolic as linguistic signs but, therefore, may provide a schematic image of the relations between, or simply the alignment of, different parts of the language diagram, simply by virtue of having the capacity "to detach the diagrammatic, iconic forms of relations from the strictly conventional, symbolic features of that system" (Jakobson, *ibid.*). Different types of diagrammatic iconicity in gestures representing sentences, or sentence diagrams, will be introduced and illustrated in chapter IV of the dissertation.

3.1.3 Metaphor iconicity

Having discussed image and diagrammatic iconicity in the previous sections, we now turn to the third and most abstract type of icons: *metaphor*, which, according to Peirce, resides in *thirdness*, e.g. the realm of laws, conventions, and habits, and comprises both image and diagram. As was pointed out

earlier, *metaphor iconicity* requires a sort of cognitive-semiotic detour in establishing similarity: two objects, or concepts, are brought into relation due to certain characteristics they share (concerning form, function, qualities, structure, etc.), and one concept is represented indirectly through another concept (Liszka 1996: 37f.).³⁸

In the gesture literature, *Metaphorics*, are defined, after McNeill (1992: 80), as gestures that simultaneously depict two things: A) the base (vehicle or source domain) of the metaphor, namely the concrete entity or action represented in the gesture and B) the referent (tenor or target domain), that is, the abstract concept expressed by it. With recourse to Lakoff & Johnson (1980), they are said to refer to an abstract entity by depicting certain aspects of the source domain of an underlying metaphorical mapping in the conceptual system. Previous work on metaphoric gestures has shown that they are not random, individually construed movements, but exhibit recurrent forms and meanings (Calbris 2002; McNeill 1992; Müller 1998, 2004; Webb 1996) – and thus they exhibit some of the characteristics of conventionality. Keeping in mind that the different semiotic modes tend to layer in a sign process, a metaphoric gesture is thus always iconic in the sense that its imagery renders aspects of the concrete source domain. To represent this conceptual/semiotic linkage, gesture researchers usually adhere to two separate ways of annotating a metaphoric gesture: one describing the iconic (and/or deictic) qualities of the gesture and one indicating what the pictorial content stands

³⁸ "For example, 'Before he could hear the shot, he fell, his body a spilled vessel of wine.' The metaphor conveys the sense of the disposition of the body as blood flows from a wound by showing it parallel to the disposition of a spilled bottle of wine. So the metaphor is not an analogy (and hence a diagram), since it doesn't aim to show a similarity in relations between two things but to represent the representative character of one thing by means of another thing which has similarity to the first in a certain respect" (Liszka 1996: 37/38).

for metaphorically (McNeill 1992: 94ff.; Parrill & Sweetser 2004; Sweetser 1998).³⁹ As will be discussed in more detail in chapters IV and V of this dissertation, spatial metaphor has been found notably to be heavily exploited in the visuo-motor modality (Bouvet 2001; Cienki 1998; Enfield 2003; Müller 1998; Núñez 2004; Sweetser 1998; cf. Taub 2001; P. Wilcox 2000; S. Wilcox 2004). Spatial metaphor surfaces in the gesture modality also in instances when the concurrent speech does not convey a spatial conceptualization. Examples for such metaphorical understandings that find their iconic (spatial) expression include: social organization represented in terms of spatial organization, conceptual structure in terms of physical structure (Sweetser 1998), ideas as objects (conduit metaphor; McNeill 1992) or locations as objects (Sweetser 1998), and moral concepts in terms of spatial concepts (Cienki 1998).

In strictly Peircean terms, a sign receives a metaphorical interpretation when calling to mind an icon (a schematic structure) based on a parallelism. As Köller (1973: 103) has argued in his extensive work on Peirce and the semiotics of metaphor, the interpretative process involved in understanding a linguistic metaphorical expression such as 'I can't get a grasp of this theory' requires more than connecting a signifier and a signified. Rather, a metaphor is seen as a composite sign with a complex predicative structure allowing for corresponding direct and indirect semantic structures. Simply linking up signifier and signified for the notion 'grasp' would indeed only capture the literal reading, not the intended figurative meaning.

³⁹ One can further distinguish between iconic gestures that are performed from character viewpoint (C-VPT) from those that exhibit observer viewpoint (O-VPT), see McNeill 1992.

Here it is of great advantage that Peirce's notion of the *interpretant* has a dynamic character, being a function of the linguistic and pragmatic context as well as the interpreting subject with his or her own perspectives and experiences (Köller 1973: 111). Also, the fact that the interpretant can encompass not only a single sign but a group of signs associated with a representamen allows for the variable interpretation of a metaphorically used sign. Köller (1973: 112) further explains that the variability of the meaning of a sign increases with the pragmatic polyfunctionality of a sign system (which can be said to be more strongly pronounced in gesture than in language). He further posits that metaphors develop their cognitive and communicative function dialectically through the exploitation of the tension arising between usage-based, stabilized regularities of a system on the one hand (including conventional metaphors and gestures, I assume) and varied, creative possibilities of sign usage (novel metaphor, gestural descriptions) on the other. Now, compared to language, the use of gestural signs does not appear to be equally regulated. There seems to be, however, recurring characteristics in the gestural depictions of objects, attributes, and actions. And if gesture production indeed does show certain semantic and structural regularities, speakers are probably not very conscious of them. One aim of this study is to discern such regularities – within the context of teaching linguistics and across the subjects of this study.

Based on Peirce's theory and Köller's discussion thereof, I assume that conventional metaphors can be counted as stabilized regularities and that novel metaphor can be viewed as creative variations of more habitual sign use. It further has been suggested that iconic gestures are to some extent

regulated by the structure of the more or less stabilized physical environment they imitate (secondness), by the specific affordances of the medium (arms, hands, body, space), and by the integration of concurrent speech and gesture. Furthermore, metaphoric gestures seem to be regulated through habitual non-propositional metaphorical conceptualization (thirdness) that underlie figurative expressions in both modalities.

Here I would like to make a link back to Jakobson's theory of metaphor and metonymy as the two major modes of association that can find expression in linguistic and non-linguistic modalities alike. As discussed earlier, metaphor (iconicity) relies on a certain distance or contrast between the two concepts that are brought together based on shared characteristics. This distance can hold between the idea that is expressed and the item that is used to refer to it (for instance, Braque's painting *Young Girl with Guitar* (discussed above, is in its entirety a metaphor standing in for the concept of a woman), or it can concern the difference between abstract ideas and structures on the one hand and their concrete/material representations on the other (as, for example, the notion of time is represented in Dali's painting *The Persistence of Memory*, also discussed above). In the case of the present data, grammatical categories and functions are translated into the concrete, bodily medium. Put differently, most of the gestures under consideration here refer to the abstract realm of grammar. These gestures are thus the means of making abstract phenomena more concrete and perceptual by giving them a visual, embodied expression. Looking at the entirety of all gestural transformations of abstract ideas as a text/discourse, we could say that the entire gestural text functions as a metaphor, i.e., a total metaphor (Lodge 1977: 110; cf. chapter 1). That is to

say that all these gestures are, also according to Peirce, in a sense metaphorical, as they all represent abstract objects through some kind of parallelism between the conceptual and the gestural.⁴⁰

These observations are central in the context of this dissertation and will be elaborated in the following sections. The fact that both icon and diagram are said to reside in metaphor will be explored in the following ways. First, I will examine the image-schematic basis of metaphor more closely, thus illuminating the ways in which Peirce's semiotic and cognitive metaphor theory can complement and illuminate one another (cf. section 2). Second, I will give an overview of how the relationship between iconicity, image schemata, and metaphoricity has been treated in the gesture and signed language literature (cf. section 3 of this chapter). In the ensuing chapter, I will introduce different types of metaphor iconicity and diagrammatic iconicity in gesture.

3.2 Image, schema, and metaphor: Where Peircean semiotics and cognitive metaphor theory meet

Central to the present dissertation is the insight that the intricacies of the different iconic modes discussed above can be discerned, to a certain degree, in the functioning of conceptual metaphors. As is well-known, Lakoff and Johnson (1980: 3) maintain that "our ordinary conceptual system, in terms of we both think and act, is fundamentally metaphorical in nature," and define

⁴⁰ Other examples of materialized metaphorical understandings of similar phenomena are so-called pictorial metaphors (Kennedy) in visual representations or grammar from the tradition of the art of memory (personifications, memory buildings, etc.; cf. Mittelberg 2002).

the essence of metaphor as “understanding and experiencing one kind of thing in terms of another” (p. 5). They further posit that “meaning and value are grounded in the nature of our bodies and brains, and in our physical, social, and cultural environments” (Johnson 1992: 346) and place the bodily, or sensorial perception in the center of their theory, claiming that embodied image-schemata conceptualize our experience at a non-propositional level (Johnson 1992: 349). This study is based on the view that these image schemata underlie aspects of both linguistic and gestural expressions, and that our perceptual system and image-based reasoning is grounded in multidimensional experience, e.g. multimodal models of both concrete and abstract phenomena. The focus here is on the gestural rendition of dynamic aspects of image and motor schemata that have been internalized through the *bodily* interaction with the physical and social environment.⁴¹

The main tenets, developments, achievements, and shortcomings of cognitive metaphor theory have been extensively summarized and discussed elsewhere (cf. Johnson 1987; Lakoff 1993; Lakoff & Johnson 1980, 1999; Sweetser 1990). It lies outside of the scope and the objective of this dissertation to engage in such an enterprise. Instead, I will build on the semiotic foundations laid out in the previous sections, point to relevant places in the cognitive linguistics literature, and draw on Danaher’s (1998) discussion of cross-fertilizing aspects of Peirce’s semiotic and cognitive metaphor theory. As will become evident below, Danaher provides a revealing lens on the

⁴¹ I have argued in previous work (Mittelberg 2002) that our perceptual system and image-based reasoning is not only grounded in *direct* experience with our physical and social environment, but is also conditioned by *indirect* experience mediated through cultural artifacts such as printed words and pictures.

parallels of the two approaches, some of which can, as I hope to show, illuminate, and also be illuminated by, the semiotics of gestural sign constitution and communication. Since I consider Danaher's discussion as extremely insightful and useful in highlighting some of the central semiotic principles in representational gestures of the abstract, I will here treat, and respond to, his arguments in detail, and point to their entailments for gesture studies (undertaken from the perspective chosen here). In the next chapter, I will elaborate on implications pertaining to indexicality and metonymy. I will argue that the iconic modes *image*, *diagram*, and *metaphor*, as introduced by Peirce, can also shed light on the functioning of conceptual metonymy, and particularly on the interaction of metaphor and metonymy, as proposed by Jakobson. As both types of semiotic modes are anchored in the embodiment of perceptual and kinesthetic experience in the first place, the gesture modality may provide a window on the oscillation between the conceptual and the grounded, e.g., between thought, experience, and (self-)expression.

3.2.1 Image schemata as iconic symbols

Image schemata are, according to Johnson (1987: XIV), "recurring, dynamic patterns of our perceptual interactions and motor programs that give coherence and structure to our experience." Re-reading this definition, also reflected in the title of Johnson's book *The body in the mind: The bodily basis of meaning, imagination, and reason* with gesture in mind, one is immediately reminded of the core principles of embodiment of meaning and understanding, e.g., of the role the human body plays in experiencing and conceptualizing physical interactions with space, objects, persons, and the environment in general.

For us to have meaningful, connected experiences, there must be regular patterns to our actions, perceptions, and conceptions. Image-schemas reflect these recurring patterns and emerge through our bodily movements through space, our manipulation of objects, and our perception of the world in which we live. (Gibbs and Coulston 1995: 369-370)

Given that concepts are assumed to be multidimensional gestalts comprising image-schematic, perceptual, kinesthetic, tactile and other interactional properties (Johnson 1987, Lakoff 1987), it comes as no surprise that gestures seem to pick out those dimensions that correspond to the logic of their own materiality and the medium of space. Whereas the mind may translate spatial, perceptual, and tactile input into more abstract forms, gestures, by virtue of being dynamic sensori-motor signs produced by the human body, are semiotic acts through which such action patterns, oriented toward people, objects, etc., are externalized and used for meaningful communication (Arnheim 1977; LeBaron & Streeck 2000; Müller 1998; Streeck 2003).

As Johnson (1987: 28) emphasizes, image schemata are much more schematic and abstract than rich mental images. Importantly, they are supposed to have a well-defined internal structure, consisting of related parts that form a whole, i.e. a gestalt.

Image schemata exist at a level of generality and abstraction that allows them to serve repeatedly as identifying patterns in an indefinitely large number of experiences, perceptions, and image formations for objects or events that are similarly structured in the relevant ways. Their most important feature is that they have a few basic elements or components

that are related by definite structures, and yet they have a certain flexibility. As a result of this simple structure, they are chief means for achieving order in our experiences so that we can comprehend and reason about it. Typical schemata will have parts and relations. The parts might consist of a set of entities (Such as people, props, events, states, sources, goals). The relations might include causal relations, temporal sequences, part-whole patterns, relative locations, agent-patient structures, or instrumental relations. Normally, however, a given schema will have a small number of parts standing in simple relations. (Johnson 1987: 28)

An example of a pervasive image schema is the PATH or FROM-TO schema which consists of a beginning (source), an end point (goal) and a vector tracing a path between the two points (Johnson 1987: 28). This schema is manifest in events such as walking from one point to another, throwing a ball, punching someone, etc.



Despite this static representation such schemata are not static images, but malleable, dynamic patterns of activities that can take on different instantiations in varying contexts and media. Additional examples of image schemata include containment (in-out orientation), support, balance, force, center-periphery, near-far, up-down, front-back, toward-away from, part-whole, verticality, process, etc. Moreover, image schemata are supposed to provide the conceptual structures for metaphorical projection: they motivate the imagic properties of certain types of metaphors and hence the schematic – or diagrammatic (if one wanted to stay closer to Peircean terms) – structure of

the source domain that gets mapped onto the target domain (Lakoff & Johnson 1980; Johnson 1987; Sweetser 1990).⁴² With respect to the path schema above, a possible metaphorical extension would be the LIFE IS A JOURNEY metaphor which entails a movement at a certain pace and along a path with possible stops, obstacles, detours, impasses, rocky surfaces, etc. along the way that have consequences for the travelers. Also, one can conceive of movement through imagined or abstract space. Another fundamental group of schemata are IN-OUT and CONTAINMENT schemata which emerge in our bodily experience of having a body with an inside and an outside and also of moving with our body in and out of bounded spaces. Abstract entities such as states, events, and also grammatical categories may be interpreted as spatially bounded entities (either solid objects or containers with a hollow inside) that we can manipulate in our thoughts. As Sweetser (1987, 1990) has shown, metaphorically oriented mental actions are based on physical actions (such as to pick out, leave out, take out, etc.). Furthermore, the concept of viewpoint (visual perception) has been shown to be mapped onto metaphorically construed viewpoints which determine the perspective from which temporal, spatial, and other orientations are viewed in discourse space, for example (Sweetser 1999, 2004).

Revealing connections between cognitive metaphor theory and Peirce's pragmatic theory of experience, Danaher's (1998) views conceptual metaphors as cognitive habits, i.e. translation frameworks for metaphoric linguistic expressions such as 'my life is at the crossroads,' to stay with the metaphor

⁴² It is impossible to provide an overview of the latest advances in image schema research. For an overview see Grady & Hampe (fc.) and Lakoff 1987.

introduced above. According to Danaher (1998: 189), embodied image schemata – derived from and operating in our perception, our bodily movement through space, and our object manipulation (Johnson 1987: 23) – can be described in Peircean terms as iconic symbols which have acquired their symbolic status through habits of interpretation, e.g. regular interactions between the conceptual and the experiential resulting in the perpetual formation of similar *interpretants*. Image-schemata can, following one of Danaher's (1998: 190) central points, be seen as iconic symbols contained within symbolic symbols. In order to fully appreciate these admittedly condensed statements, I will now trace his argumentation step for step and draw out the connections I see between his claims and gestural representation.

In alignment with the interests of both Peirce cognitive semantics, Danaher's discussion focuses on the relationship between experience and interpretation. Meaning (*interpretants*) can be understood as arising through translation of a given sign stemming from one sign system into another sign system. Gesture clearly participates here, adding a visual sign system to the linguistic and the conceptual. According to Peirce, icons, indices, and symbols are to be understood as inseparable from experience; they are real descriptions of experience. One of the fundamental assumptions is that all experience is given to us semiotically. Thereby the experiential and conceptual interact: ideas are rooted in real and transposed experiences, i.e., the mind translates perceptual and experiential knowledge into more abstract forms of knowledge (Danaher 1998: 188/189).

In a similar vein, image schemata are viewed as general (conceptual) structures abstracted from our habitual bodily experience, not only perception (which is often stressed in the literature), but also motor actions (which are important with respect to gesture). They constrain and structure our perception, understanding and reasoning, and help us make sense of all the different types of information we mediate. They are not concrete, detailed images or pure icons, but rather, according to Danaher, symbols with a strong iconic ground and generalized interpretative accounts of sensuous experience, crystallizing the relation between habit and schematic structure and thus providing a framework for interpretation of particulars. Image schemata are conceptual gestalts resulting from, guiding, and in certain instances, anticipating interpretative responses to the environment as well as to abstract thought.

Such gestalt structures fulfill a central function in guiding the translation of the internal organization of image schema into a medium of expression and also in motivating metaphorical projections of image schemata into abstract realms. Force gestalts are especially relevant here, as the human body is exposed to forceful impacts and can be used as a means of impact on other people and things. One of the most fundamental experiences of a human being is the interaction with forces in the environment exerted on the body, such as blockage of movement (e.g., via obstacles, barriers, and other forms of resistance), impact on body (collision with objects and people), compulsion (a force moves an object along a path), counterforce, gravitation etc. While it is assumed that our bodies are more or less alike in terms of their physiological make-up, and while one consequently expects to find commonly developed

gestalt structures for many of our physical interactions with the world, one should not forget that "experiential basicness is a relative matter" (Johnson 1987:), and depends on factors such as cultural heritage, background knowledge, motivations, interests, values, attitudes, previous experiences, and so forth, which in turn influence the ways in which these articulate structures are projected from the domain of physical, preconceptually patterned experience onto social, epistemic and speech act realm (Johnson 1987: 62f.). Sweetser (1990) has argued that our experience with physical force and barriers motivates inferential structure in the epistemic domain, e.g., the meaning of modal verbs (enablement, permission, necessity, etc.). The point I wish to make here here is that a person's body language, including hand and arm movements, reflects not only basic force gestalts (push, pull, block, etc.) but also subjective renditions of impacts and reactions to them, whether they are of concrete, emotional, psychological, attitudinal, socio-cultural, or yet another nature.

It thus seems that some of the senses and channels we use to build our knowledge about the world are reflected in gesture; in fact, we still seem to be doing many of the original actions of acquiring and comprehending the physical world when we gesture (move, mold, draw, trace, grasp, push, pull, weigh, etc.; cf. Müller 1998). As I will try to show in the next part of this dissertation, gestures seem to attest to the 'semiotic reality of image-schemas' (Danaher 1998: 1990). Or, put differently, gestures reveal aspects of embodied meaning and behavioral patterns in a way language cannot. Force gestalts and other dynamic concepts play an important role here as we acquire these

notions first and foremost through our bodies. The following quote stresses the role of behavioral side of meaning:

Meanings are to be understood, for Peirce, as relational structures emerging from behavioral patterns, as emerging from the lived through response of the human organism to that universe with which it is in interaction.... [I]t is in behavior that the relational patterns which constitute conceptual meaning are rooted. [...] Sensual recognition and conceptual interpretation represent two ends of a continuum rather than an absolute difference in kind. (Rosenthal 1983: 578; in Danaher 1998: 191)

If image-schemata are the result of and also provide experiential grounding (Danaher 1998: 187) through embodiment, gesture personifies this, in certain ways, par excellence.

3.2.2 Metaphorical projection of image schemata: Conceptual metaphors as cognitive habits and frameworks for semiotic translation

When taking a Peircean pragmatist approach to the analysis of semiotic acts, the goal is to understand the general principles that motivate the data (from qualities, facts, and their dynamic relations to coherent patterns). Similarly, applying cognitive metaphor theory to language (and gesture) data involves the search for patterns of ontological correspondences across domains of experiences (Lakoff 1993). As we saw above, concepts are multidimensional gestalts derived partly from interactional properties (image-schematic, perceptual, motor activity, purposive, functional); they are made of particulars, with several parts that are connected in thoughts, feelings, etc. The diagrammatization of the relations between the parts (as the SOURCE, PATH, and GOAL in the path schema) contributes to the schematic nature of meaning such that schemata may fit many instances of meaning-making (depending on

the degree of iconicity (Waugh)), which makes them highly efficient tools of interpretation, be the object-sign relation iconic or metaphorical. Here the gesture modality can bring to light those visuo-perceptual and sensory-motor aspects of mental models that defy linguistic representation or would require laborious paraphrases, e.g., in the case of spatial and hierarchical constellations and movements through space.

From a Peircean perspective, conceptual metaphors, according to Danaher (1998: 180f.), are (cognitive) symbolic signs, e.g., interpretants, with iconic grounds (based on similarity). A distinction is made between conceptual metaphors such as LIFE IS A JOURNEY and individual metaphoric expressions that reflect such mappings: “[a]s linguistic signs, metaphorical expressions, both conventional and poetic, are symbolic propositions; moreover, they are understood as tokens of more general cognitive symbols which cognitive linguists call conceptual metaphors” (Danaher 1998: 185). According to Lakoff and Johnson, in a metaphorical mapping of two concepts, the source domain is said to provide structural information (concrete, experientially familiar) used to structure parts of the target domain. Metaphorical expressions, such as “I see what you are saying” describe the target domain of understanding in terms of the source domain of visual perception, calling to mind an icon, e.g., a schematic structure of the source domain. Another example, directly appealing to manual actions, is “I can’t get a grasp of his argument. “The icon evoked in the mind, which Danaher describes as a mental composite photograph of past experiences, permits an experientially and habitually grounded interpretation, whereby the semiotic mission of the icon is the translation of the source domain structure

into the terms of the target domain (**UNDERSTANDING IS SEEING**, **UNDERSTANDING IS GRASPING**; Lakoff & Johnson 1980). Put differently, conceptual metaphors act as symbols and provide translation frameworks for the interpretation of a single metaphorical proposition occurring in actual language.

As cognitive symbols, conceptual metaphors give meaning to the metaphorical expressions they motivate by habits of interpretation (Shapiro 1983: 39). A habit, in a Pericean sense, is a ‘generalizing tendency’ [...] It is in other words, a framework for the association of ideas (1960, 4.4478).

Conceptual metaphors are cognitive habits which provide a framework for interpreting conceptual experience (as it has already been interpreted) in language. Since habits are symbols, conceptual metaphors necessarily contain indexical and iconic elements. Although these elements can be abstracted (“prescinded”) for analysis, they are integral and necessary to the proper functioning of the conceptual sign as a complex gestalt (Danaher 1998: 185).

The notion of “framework for associations” reminds us very much of Jakobson’s theory of metaphor and metonymy as two modes of association. As for ‘cognitive habits’, forming sentences based on abstract principles and structures probably also falls into this category. A conceptual metaphor seems to guide the reaction (interpretant) to the imagery evoked by a figurative expression. Danaher also says that conceptual metaphors can be seen as interpretants of iconic symbols in predicates and that they provide a sort of translation framework for such composite signs. It seems to me that some of these iconic aspects of cognitive SYMBOLS are translated into gesture. One of

the image schemata that are heavily exploited for metaphorical projection in the present study is the OBJECT schema, confirming the assumption that “[c]oncrete objects serve productively in metaphor to configure objects with respect to certain attributes” (Lakoff & Johnson 1980: 125). Speakers constantly handle virtual objects standing in for concrete and abstract entities. As we will see, it is often the case that gestures referring to abstract things iconically convey some information of the concrete source domains, e.g. a solid object being held in the hands of the speaker, while the linguistic expression ‘infinitive’ is an abstract technical term and as such not a metaphorical expression. The object/container gesture thus suggests that an infinitive (as unreal, abstract, and unfamiliar as that entity might be to students) can be seen as a concrete, graspable object. This may engender some sort of a reassurance for the students who need to orient themselves in new abstract knowledge domains; it can also be understood as making reference to bounded entities such as words in visually represented sentences, with which the students are familiar due to experience with reading and writing.

Coming back to Danaher’s terms, the question here is in what ways metaphorical gestures provide translation frameworks, too. One principal aspect of the data analysis is to investigate whether conceptually underlying image-schemata do in fact surface in the form of a linguistic metaphor, whether they manifest themselves in the gestures that illustrate the source domains of a metaphorical mapping, or whether they find expression in both modalities. If we find that the metaphorical understanding shines through in gesture (and even more frequently and more strikingly than in language), I would suggest that embodied image schemata seem to guide the gestural ‘ex-

bodiment' of conceptual structure in a dynamic fashion, that is, through visible actions that seem more intuitive than rational linguistic utterances. A question I see arising here pertains to where the 'indexical symbols' come in. Given Danaher's assertion that image schemata are symbols with an iconic ground, my question here is whether we can say, with the same certainty, and with recourse to Jakobson (as Peirce does not treat metonymy, only contiguity and indexicality, and Danaher does not discuss metonymy, either), that metonymy has an indexical ground while also relying on schematic / diagrammatic relations between wholes and parts (essential properties, adjacent elements, etc.)? As a matter of fact, Danaher proposes a way to integrate indices into the equation, and we will see how below.

3.2.3 Abduction and some of its implications for the interpretation of linguistic and gestural metaphor

As we have seen in the section on Peirce, the central type of inference in his theory is abduction. Danaher illuminates the role that this iconic mode of inference plays in reasoning and cognition (Danaher 1998: 193ff.). Abduction, understood as the everyday logic par excellence, includes observation, interpretation of real phenomena, the assimilation of reality into the cognitive system, the rise of meaning (interpretants), and supposedly underlies all cognition and the first stages of scientific reasoning (Danaher 1998: 195).

Perception is defined as a type of abductive inference leading to knowledge; it represents proto-abduction and provides the basis for the interpretation of experience. Given that gestures are perceived visually, this mode of inference and interpretation seems to be of relevance to their interpretation and means of expression.

Perceptual judgments are viewed as abductive mappings of reality into the mind without which experience cannot be assimilated into the 'cognitive program' (Nesher 1994: 113). They are the first steps in the translation process which makes it possible for language to iconize, via mediating representations (i.e., interpretation), reality. (Danaher 1998: 196)

This reveals the pragmatic character of cognition, and abduction, implicit in Peirce's semiotic. What is key here is to understand the relationship between image-schematic representations of experience as iconic grounds for conceptual metaphor and common abductions that structure our understanding of the world and can also constrain our reasoning about a situation. They involve the formulation of hypotheses which are to be tested via our physical, emotional, and intellectual experience; new insights are possible through the creative power of (metaphorical) imagination and reasoning.

The hypothetical (diagrammatic and metaphorical) icon which we create to represent a real object and upon which we mentally experiment in our efforts to better understand the object does not necessarily have to be an accurate representation of reality [...]. (Danaher 1998: 197)

These aspects are of course relevant to the context of teaching grammar and linguistic theories, which are highly abstract constructs and knowledge domains, where the accurate representation of reality is not the main goal, but rather the representation of theoretical paradigms.

Building on these considerations, I will now offer some thoughts on abduction, iconicity, gesture, and teaching. If abduction leads to 'received patterns of reasoning' (Liszka 1996) and if conceptual metaphor does provide

such patterns, or frameworks, based on image-schemata (object, container, source-path-goal), then we can take this into the gesture context and argue that gestures, at least in the data of this study, may be at times illustrations of such patterns. They can further be said to be translations from the conceptual domain to bodily expression, picking out facets of multidimensional concepts. They also may give visual 'plausible accounts' (Eco 1986) of abstract knowledge, thus illustratively supporting the introduction of specialized linguistic terminology, concepts, knowledge, etc., which is part of what Eco called undercoded argumentation. As we will see, gestures – motivated, among other aspects, by figurative thought – play a role in the cognitive/semiotic process of knowledge mediation and integration. For example, gestures provide a diagram (a grid as cognitive support) underpinning the conceptual content of an exposition. The gestural image of a sentence (e.g., in form of a diagram) is familiar due to experience with reading and writing in a linear fashion (speakers know what kind of elements can be lined up in a linear sentence structure). By setting up a sentence space in gesture space, a familiar structure can be used to point to new syntactic elements, functions, and operations that are introduced in a linguistics course and go beyond the previous knowledge a student has of basic grammar. If image schemata and conceptual metaphors function as interpretative frameworks (developed/generalized habits and patterns) for incoming information, then the gestural rendition of iconic aspects of the source domain underlying conceptual mappings can be assumed to help abductive inferences leading to knowledge integration and thus learning.

These observations lead me to suggest that Eco's notion of overcoded and undercoded abduction (cf. chapter I) can be brought together with different degrees of complexity of metaphorical mappings. Overcoded abduction can be related to common conventional metaphors (object, container, etc.); undercoded abduction can be related to creative, novel metaphor, and especially to theoretical constructs which are themselves based on metaphors (see the different linguistic theories covered in the data). In the case of the latter, additional efforts are called for on the side of the teachers to offer opportunities for the students to integrate old and new terminology and knowledge. Gestures seem to help here, too, by delivering the 'literal' side of the metaphorical mapping: objects (often taken from the overcoded domain) that we can, at least in principle, touch, hold in our hands, thus making abstract notions concrete and tangible. New concepts and views get more and more integrated into the students' understanding -- a process which engenders an increasing degree of codification.

These considerations highlight the limitations and affordances of the different modalities that result in different iconicities and degrees of iconicity in gesture and language respectively. Danaher points out that although iconicity is a semiotic principle that is central to both cognition and language, the perspective should be first broad and semiotic and then cognitive or linguistic. In Danaher's account, the principle of iconicity in language and cognition is understood within the context of a universal theory of signs and sign interpretation, a perspective which is also favored in the dissertation. With reference to Aristotle, Danaher (1998: 201) concludes that metaphor does

induce insight, which represents another interface of Peirce and cognitive metaphor theory:

As mappings from source to target domains, conceptual metaphors provide frameworks for translating from one sign system (the conceptual system) into another (language). As mediating representations they exemplify Peirce's understanding of meaning as Thirdness. When cognitive linguists claim that metaphor pervades our conceptual system, they are therefore echoing the basic Peircean notion that sign translation, via the interpretant, is necessary to meaning. (Danaher 1998: 201).

The question that remains to be investigated is, as pointed out earlier, whether the meaning of spontaneous representational gestures arise in thirdness.

3.3 The human body as visuo-dynamic medium: Tangible evidence for the central role of iconicity & metaphor in embodied cognition and communication

In the previous sections, I have put forward arguments in favor of investigating spontaneous gesture as a source for additional evidence not only for the semiotic modes suggested by Peirce but also for principles inherent in image schemata and metaphor. At the same time, I suggested that these cognitive-semiotic frameworks may help us discern fine distinctions in the mechanisms of gestural representation. In what follows, I will give a brief overview of research done on signed languages and gesture carried out from a cognitive linguistics perspective. Again, insights concerning iconicity, metaphor, and metonymy are at the center of interest.

3.3.1 Signed languages research from a cognitive linguistics perspective

Given that gesture and signed languages use the same media of expression, namely the human body and space, there has been a lot of cross-fertilization between gesture research and cognitive approaches to American Sign Language (ASL) (Dudis 2004; Liddell 1998, 2003; Taub 2001, P. Wilcox 2004; S. Wilcox 2000, 2004) and French sign language (Bouvet 1997). Of course, signed languages are, compared to spontaneous gestures, highly conventionalized semiotic systems with elaborate mechanisms of sign constitution, morphology, syntax, discourse structure, etc. Yet together these lines of research have offered support for the idea that visuo-dynamic modalities can indeed provide evidence for central claims made in cognitive linguistics, and especially in cognitive metaphor theory (Lakoff & Johnson 1980, 1999; Johnson 1987; Lakoff 1993; Sweetser 1990). Here I will focus on the work that directly addresses issues that are particularly important in the context of the present dissertation and have the potential to complement and reinforce what I have discussed in the sections above.

Wilcox and Morford (fc.) explain the ways in which cognitive linguistics has brought new energy to the study of signed languages. The authors present a variety of theoretical perspectives and empirical methods that have been adopted by sign language researchers working within cognitive frameworks. Notably, these tools allow for the investigation of phenomena that are at the center of interest within the cognitive linguistics paradigm: grammaticalization, polysemy, iconicity, metaphor, metonymy, and so forth.

One important contribution to this body of work that is of particular relevance here is Taub's (2001) model for sign constitution in American Sign Language which accounts for both iconicity and metaphor. In the discussion of her work, I will progress from iconic signs to metaphoric signs, just as she does in her book. When illustrating her analogue-building model, she starts with an example of sound symbolism in spoken English (e.g., 'ding' representing the sound of a bell) and then provides the example of the ASL sign for 'tree' (consisting of one arm and hand held horizontal and the other hand vertical with a hand with fingers apart standing for a tree growing out of a flat ground with branches atop a bare trunk). The analogue-building process, resulting in the creation of iconic items involves several well-defined elements (p. 44): (A) the initial concept 'tree', (B) prototypical visual image of a tree, (C) an image schematized to fit ASL's categories and (D) the image encoded as TREE. The corresponding stages in the process are: (1) image selection, (2) schematization, and (3) encoding, all of which ensure structure-preserving correspondence between B, C, and D.

In the *image selection* stage, a sensory image is selected from the kinesthetic images and other information that one might associate with the concept 'tree.' The selected single image that achieves the status of representing the concept TREE is necessarily a reduction of the object. As one can imagine, the selection and exact articulation of these images depends on the given culture and sign language it is part of; choices thus vary from language to language and culture to culture. Now, Taub (2001: 45) points out that "[s]electing a single image to stand for a complex associated concept is an example of the cognitive process of metonymy" and that the "association

between image and concept can be more or less direct and compelling." In the case of the linguistic iconic item 'ding,' where the concept is the sound of a bell, an auditory image of that sound is chosen to fit with the phonotactics of the English language. As far as the ASL sign for 'tree' is concerned, the image chosen represents a prototypical exemplar of its category. Taub gives another example that illustrates the metonymic principle even better. The ASL sign for 'academic degree' represents, by alluding to a cylinder shape, a rolled up diploma. It is thus the visual representation of an important object (metonymically) associated with the degree: "The degree itself is a nonphysical title, rather than a physical object, and so a salient object is chosen for the purposes of creating an iconic sign" (p. 46).

In the *schematization* process, the resources of a given language are exploited to represent the selected image in an economic way, that is, the level of complexity is reduced to important features: "the vivid image of a tree growing out of the ground is distilled into three main components" (p. 46). This way, the flat level surface, the trunk and a schematic branching structure atop the shaft are presented, but not the uneven surface of the tree trunk, neither smaller branches nor leaves. What is crucial here is that the schematic image preserves most of the structural relationships of the original, thus reflecting a structure-preserving mapping between the original conceptual image and the sign. Thereby the original sensory image, as Taub emphasizes with reference to Marr (1982), is already schematized, due to the constraints of our perceptual and cognitive systems, and generalized.

Although Taub does not mention metonymy in this connection, it appears to me that we can assume synecdochic principles to be at work in this process as well. If the selected parts that get to be represented in the schematic image stand for the entire rich image, then we can discern a part-whole relationship between the two (internal metonymy, Jakobson). Moreover, with respect to the fact that the schematic image preserves the structural relationship of parts of the original (ground, trunk, branches), this can also be interpreted, from a Peircean perspective, as an instance of diagrammatic iconicity with again a part-whole relationship holding among the parts that make up the internal structure of the sign. This also reminds us of what Johnson (1987), Danaher (1998), and others maintain about the internal structure of embodied image schemata and the implications for gesture studies I suggested above.

The final stage in Taub's model is *encoding*, and entails selecting a physical form to represent the parts and overall structure of the image and results in a form-meaning mapping (p. 47ff.). To take up the ASL TREE example again, the horizontal forearm and spread hand can represent a flat surface (ground), the upright arm tall support (trunk), and the spread hand on top of the vertically held arm a branching structure (branches). In this way, the different articulators are arranged such that the spatial structure of the original image is preserved, that is, we can still see the iconic building blocks that resemble parts of the original image. Yet this process is more constrained than free mime or imitation, and it is also language-specific: each language has its iconic tools or, to use cognitive linguistics terms, its iconic image-schematic items which ensure the mapping of semantic categories (e.g., flat, tall,

branching) and the corresponding phonetic forms (horizontal arm, upright forearm, spread hand). The preservation of particular combinations of tools leads to a permanent representation of a meaning; permanent mappings become part of the lexicon of a given sign language. Examples of prominent mappings include shape-for-shape (as in the examples above), motion-for-motion, motion-for-path, location in physical space for location in abstract or discourse space, etc. Grammatical elements also undergo these kinds of processes, e.g., in the iconic order of clauses to represent the temporal ordering of the events described in a schematic way.

Taub (2001: 56) asserts that both linguistic iconicity and mime, or imitation, rely on analogue building processes. However, conventionalization and clearly-defined phonetic and semantic categories are missing in mime, which "is constrained only by the imitator's conceptualizing power and physical skills" (P. 56), and languages have devices to incorporate free mime into sentences. Overall, Taub sees her model not as a statement about what is going on in the mind/brain of a person that creates an iconic item, but rather as a framework for linguists to discuss phenomena of iconicity in signed languages. From a cognitive linguistics perspective, she stresses the distinction of sensory images that are associated with a concept and its schematic representation in a selected sign standing in for the concept, given the constraints of a particular modality and/or linguistic system. Her model shows how autonomous semantic components participate in the construction of forms, making iconicity not only possible but also a pervasive feature of signed languages. She reminds us that

[I]t is simply a fact that we have far more visual and kinesthetic images associated with many more concepts than we have auditory images: All objects we interact with, all spatial relationships, and all human and animal motor programs generate in us either visual or kinesthetic images, or both; [...] on the other hand, relatively few objects, spatial relationships and motor programs have a characteristic visual sound. [...] Thus, users of visual/gestural language will be able to draw on a far wider range of sensory images than will users of aural/oral languages. A much greater percentage of the language's concepts have the potential for iconic representation. (Taub 2001: 61)

As sign languages seem to have a relatively great potential for iconic items, so does gesture. The insight we can take from Taub's work is that sensory images of things, actions, and relationships can be iconically depicted in the manual modality. Furthermore, she shows the ways in which some aspects of cognitive linguistic theories are apt for describing linguistic iconicity. In particular, they allow for treating the manipulation of mental imagery, mappings between images, characterizing language-specific semantic categories, and last but not least iconic encoding patterns. They may thus inform about certain aspects of the intimate relationship between form and meaning (p. 62).

Taub's model also accounts for metaphorical signs and the interaction of what she refers to as "pure iconicity" and metaphor iconicity. In the previous paragraphs, we have seen how ASL uses its resources for iconic descriptions of physical objects. These resources are also used to express abstract concepts by drawing on visual imagery. Via double mappings, conceptual metaphors are again said to provide links between domains, and these links are supposedly not random but correlated and grounded in our experiences (p. 110):

In essence, ASL metaphorical signs are shaped by *two* mappings: a metaphorical mapping from concrete to abstract conceptual domains and an iconic mapping between the concrete source domain and the linguistic forms that represent it (Holtemann 1990). The result is that the target domain is actually presented using an iconic depiction of the source domain. (Taub 2001: 97)

For example, the metaphorical sign THINK-BOUNCE consists of an iconic depiction of a projectile bouncing off the wall. It denotes a failure of communication, and is roughly equivalent to the English metaphorical sentence *I can't get through to him*. Besides allowing creative modifications of existing signs, new signs can be designed as well. These are interesting issues (and Taub provides analyses of iconicity and metaphor in ASL poems), but I will not discuss them in detail. Although Taub's model and analyses could only be sketched here, it has become clear that describing the iconic characteristics of metaphorical ASL signs is indeed recommended if one wishes to see exactly how a sign achieves its meaning. Taub emphasized that pure iconicity and metaphorical iconicity first need to be looked at in separation; then the methods of cognitive metaphor theory can be applied to the analysis of metaphorical-iconic signs.

As for gesture, a similar approach has been favored (Cienki 1998; McNeill 1992; Sweetser 1998) such that the source domain of a metaphorical mapping is also described as iconically representing the object or action in terms of which the abstract domain is depicted. The main difference between sign languages such as ASL and French sign language (Bouvet 1997) is that speakers who use co-speech gesture spontaneously imitate concrete and abstract objects and actions in the gesture modality (if they gesture in a given

moment of the speech event). I agree with Taub that conceptual metaphors seem to motivate a certain regularity in the iconic representation of abstract entities, an insight which other sign language researchers have made before but not described in the same systematic fashion (Bouvet 1997; Liddell 2003; P. Wilcox 2000; P. Wilcox 2004; S. Wilcox 2004; etc.). What one needs to keep in mind here is that the majority of the processes Taub describes are not initiated each time a signer refers to a tree, using the ASL sign described above, but that the processes of image selection, schematization and encoding went into the construction of the conventional sign TREE.

As compared to signed language, gesture seems to have even more potential to reveal the interaction of mental imagery, iconic representation, schematization of images, and metaphorical extension in the sense that these links are instantiated each time a representational gesture is produced without the need to adhere to phonetic-semantic conventions, but in a more intuitive way. That these links are not random either, but also exhibit a certain regularity will be discussed and illustrated below.

3.3.2 Gesture studies in cognitive linguistics: Multimodal insights into meaning-making

Realizing that gesture, when it accompanies speech, is a constitutive element of a speech event, a considerable number of conversation analysts have come to incorporate speech-accompanying bodily actions, such as gaze and gesture, in their analysis of communication, thus bringing to light how body, cognition, and language work together in socially and ecologically grounded meaning-making processes. Research topics include the function of

communicative body movements in lexical searches, information processing, turn constructions, speaker selection/floor management, aspect, and more global topics such as multimodal teaching and learning, etc. (Bouvet 2001; Duncan 2003; Clark 1996, Duranti 1997; Goodwin 1981, 2001; Kendon 1990, 1997; 2004; Kress et al. 2001; McNeill 1992, 2000, 2003; Müller 1998, 2004b; Streeck 1993, 1994; Streeck & Hartge 1992; Smith 2004; Tabensky 2001). This research illuminates the degree to which human behavior seems to be patterned on a number of planes (conceptual structure, grammar, prosody, bodily movements, etc.) and how social actors creatively use their cognitive/semiotic resources in the construction and expression of their own identity, both as an individual and group member.

Over the last decade, cognitive linguists have significantly contributed to the growing body of interdisciplinary research on gesture. Investigations into the logic and use of spontaneous co-speech gesture have not only enhanced our understanding of situated, distributed cognition, but have also resulted in additional evidence for conceptual metaphor. Being inherently iconic, gestural representations of abstract concepts and structures may reveal source domain information not necessarily captured by concurrent linguistic expression. The manual modality has been found to be particularly apt at depicting spatial, dynamic, and sensory-motor properties of mental imagery and conceptual processes, thus supporting theories of embodied semantics (Bouvet 2001; Calbris 2003; Cienki 1998; Cienki & Müller forthc.; McNeill 1992, 2000; Müller 1998, 2004b; Nuñez 2004; Nuñez & Sweetser fc.; Slobin 1996; Sweetser 1998; Taub 2001). Among other things, gestures may provide a window into the on-line processes of (figurative) thought, discourse

management, and the use of space as a tool that makes cognition and knowledge interactively available.

Of particular relevance to the cognitive linguist interested in how these different planes interact in real world communicative events is work done within a recently established sub-discipline of ethnography called *cognitive ethnography*. Integrating distributed cognition with cognitive semantics (notably *Conceptual integration theory* (CIT); Fauconnier & Turner 2002), Williams (2005) investigates the interplay between material structures and conceptual operations in situated cognitive activity, namely how children learn how to tell the time with a clock. The complexity of this cognitive task is reflected by the all-encompassing methodology: the gathered data comprise participant observation, audio-video recordings (elementary students and teachers during math lessons), interviews, and artifact analysis. Examining image schemas, conceptual mappings, and material anchors (Hutchins 2002), Williams demonstrates how speech, gesture, and artifact structure prompt, guide, and ground blends in interaction, thereby driving the construction of meaning in the unfolding discourse. Work like this suggests that one of the most promising areas of conceptual integration theory, also known as mental space theory or conceptual blending theory, is its application to discourse data (cf. Hougaard 2005, Pascual 2002; Parrill & Sweetser 2004 discuss its merits with regard to gesture analysis and transcription). In essence, this theory offers a model of human information integration, i.e., of creative online meaning construction, involving "a set of operations for combining dynamic cognitive models in a network of 'mental spaces' (Fauconnier 1994), or partitions of speakers' mental representations" (Coulson & Oakley 2000: 176).

While this approach is not implemented in the present study, it has inspired my ways of thinking about how the different planes (material, spatial, gestural, linguistic, etc.) are integrated in artifact-based cognitive tasks. Explaining grammatical phenomena is a slightly different activity, as it does not directly rely on the use of tools (such as clocks, navigation devices, etc.; cf. Hutchins (2002) on material anchors), but rather on our knowledge and practice of (written) language.

Nonetheless, Parrill and Sweetser (2004) do apply mental space theory to co-speech gesture and suggest ways in which their approach can reveal the interaction between iconicity and metaphor in gestural representations of abstract ideas, mental representations of ideas, and the discourse in which they are embedded. In their view, it is in an intuitive inferential process that the meaning of a gesture arises from "the relationship between how the hands move in producing a gesture, and whatever mental representation underlies it, as inferred both from the gesture and the accompanying speech" (Parrill & Sweetser 2004: 197). Their work represents a formalized account of the central mechanisms of meaning construction through mappings (correspondences). Although iconic mappings are one of these mechanisms, when referring to abstract domains they are not sufficient to establish the correspondence between the speech and the accompanying gesture (p. 203). With reference to Taub's (2001) work, the authors claim that the formalism of the blending model may also represent these two layers of iconic and metaphoric mappings. In addition, mental spaces and blends are supposed to be dynamic, fluidly evolving, cognitive processes by which partial structure from input spaces (e.g., the gestural articulators in the case of an iconic mapping, or, the

source domain in case of a metaphorical mapping) is combined to yield emergent structure.

One of the examples Parrill and Sweetser discuss in detail is taken from an academic lecture in which the speaker is talking about dynamic programming and using it as a metaphor for reinforcement learning (p. 205ff.): a program which solves a problem via recursion is being compared to an animal learning to find a reward in a maze. In the beginning of the discourse segment (which I cannot discuss here in detail), the operation of the computer program is described as wandering around idly ("the way reinforcement working it does just wander around idly"). The concurrent gesture consists of the following stages: both hands open with palms facing each other start in the center of the chest with the finger tips touching (the right hand is a little behind the left hand). While the left hand holds at the chest, the right hand moves over the left, makes a series of eight hopping arcs, moving forward until arm is fully extended. The right hand holds and then returns to the position of left hand. While I cannot render the author's detailed argumentation of how they identified the different mappings (e.g., path-for-path in case of the right hand's motion outward), the table below gives an idea of the correspondences they identified (p. 210; for the corresponding diagram showing the mental space mappings and blends, see p. 211). It should be noted that *Real Space* is a notion introduced into blending theory by Liddell (1998, 2000, 2003), and refers to "the mental representation of the physical elements of one's immediate physical environment" (Liddell 2000: 342). In gesture (as in ASL), the physical space, including the body and its surroundings, becomes a resource for meaning construction in which physical

space is used to represent some entity in the discourse. Making the link between the two domains or spaces (physical space and discourse) entails what Liddell calls *grounded blends*.

Table 4: Iconic and metaphoric mappings underlying gesture
(taken from Parrill & Sweetser (2004: 210))

<u>Iconic Mappings</u>	<u>Metaphoric Mappings</u>	
Real Space (gesture)	Source Domain (maze)	Target Domain (program)
Right hand	location of wanderer in maze	electrical state of circuit
Motion	activity of wandering	program operating
Left hand	location in maze before reward	penultimate state
Circularity of motion	lack of directed motion through maze	
	program operating without explicit training	

Although this method is not employed in the present dissertation, it is worthwhile to consider its main tenets and methods. It shows us one more attempt to account for the meaning-making mechanisms in multimodal discourse about abstract phenomena. While Fauconnier and Turner and other proponents of blending theory discuss metonymy as one of the principles that underly mappings in general (Coulson & Oakley; Fauconnier, Fauconnier & Turner 2002), metonymy is not mentioned in Parrill and Sweetser's account of meaning construction and discourse cohesion as aided and brought about by co-speech gesture.

In her study of videotaped recounts of the French fable ‘Renard et les anguilles,’ Bouvet (2001) offers an account of both metaphor and metonymy in spontaneous gesture. In her comprehensive analysis of postures, facial expressions, and gestural movements, she primarily draws on Lakoff and Johnson’s conceptions of image schema and metaphor. Whereas she considers metonymy as the second major projection principle by which our imagination and reasoning draw on image-schematic understandings, she makes use of neither Jakobson’s account of metaphor and metonymy nor of Peirce’s semiotic. Yet Bouvet’s work is of relevance here and insightful in the sense that it sheds light on the “réalité organique au sein de notre existence corporelle dans le monde” (Bouvet 2001: 9). One of her main goals is to show that gestural movements are not arbitrary, but rather originate in corporal behaviors and witness a certain regularity which, according to Bouvet, is brought to bear, at least in part, by two categories of iconic gestures, e.g., metaphorically and metonymically motivated iconicity (p. 24). Referring to Eco (1972: 185), she also addresses the question of the medium in which sign-object relations manifest themselves (p. 136), maintaining that the iconic code of visual signs is constructed and recognizable according to the same mental operations one uses to build the percept of an object. In order to interpret a gestural sign, one needs to recognize the pertinent features of the represented object, keeping in mind that the sign shares properties with the perceptive model of an object and not with the object itself. Here is where metonymy enters in more than one way, both of which are familiar to us from the discussions of Peirce’s and Jakobson’s work above. However, Bouvet identified a few different metonymic modes in gesture. I will base my

argumentation and examples partly on her claims, and elaborate on them by bringing in Jakobson's and Peirce's categories of similarity and contiguity.

Bouvet asserts that metonymic relations between object and sign drive the selection of the essential properties of an object that gets represented by the sign and by which the object is in turn recognized (remember the zebra and helicopter examples mentioned earlier). Bouvet further argues, and I would agree with her, that it is not enough to make a distinction between concrete and abstract referents and between iconic and metaphoric gestures respectively, as does McNeill (1992), but that one needs to take a closer look at the type of iconicity that assures the interpretation of the sign as representing a concrete referent. This relationship can be either synecdochal, e.g. the pertinent properties of the object are represented by the gestural sign, or a synecdochal relationship can be merged with a metonymic relationship. In addition, there can be an existential relationship between the gesture and the object it denotes. Let us consider some of the examples Bouvet provides. The first is one of McNeill's examples of an iconic gestural scene in which a man seemingly uses an umbrella as a weapon to chase away an animal. Bouvet asserts that there is an existential relationship between the gesture and the umbrella denoted. A different case of metonymy is a gesture representing glasses, executed with both hands making a ring with curved thumb and index finger and as such placed around the eyes, resting on the nose. The parts of the glasses that are actually rendered by the gesture stand for the entire object via synecdoche. At the same time, this can be categorized as an instance of metonymy of place, as the same gesture would not have the same meaning if produced in relation to a different part of the body (p. 25). It should be

pointed out that similarity is also of issue here since the form made by the hands is similar to the shape of the glasses.

The table in Appendix I represents a synopsis of the discussion above. It contains the different iconic modes and highlights how they are related to one another. The focus is on the relationship between iconicity and metaphoricity as described by Peirce, and as brought into relation with cognitive metaphor theory by Danaher (1998). It shows how the different modes are instantiated in gesture and points to relevant gesture research reviewed above. Moreover, I have integrated the different types of iconicity that seem to be inherent within metaphoric gestures depicting abstract grammatical phenomena. Following Peirce, I distinguish, as demonstrated above, between three subsets of metaphorical gestures: metaphoric gestures primarily based on image iconicity (firstness), metaphoric gestures primarily based on diagrammatic iconicity (secondness), and metaphoric gestures primarily based on metaphor iconicity (thirdness). The best way to read the table is to start at the bottom and go upward, following the path of increasing abstraction. The shaded area (between diagrammatic and metaphor iconicity) represents the juncture of Peirce and cognitive metaphor, and also provides a linkage, essential in the context of this study, to indexicality (contiguity) and Jakobson's notions of metonymy/synecdoche. As I will demonstrate in detail below, gestures of the abstract have not only an iconic base (which motivates the depiction of concrete and abstract phenomena), but they also seem to have an indexical base, seen in their anchorage in the here and now of the speech event and in the physical and social reality of the speaker.

What I will demonstrate in the following chapter is that there are additional metonymic modes with distinct functions in gestures, and, importantly, these metonymic modes do not only reside in iconic gestures (of concrete objects and actions), but also in metaphoric gestures. My claim is that accounting for the interaction between the two modes allows us to see and document a major part of the meaning-making processes in the data at hand.

CHAPTER FOUR

ICON AND INDEX IN CONCERT: REFERENCE AND CONTEXTUALIZATION THROUGH METAPHOR AND METONYMY IN GESTURE

In the previous sections, the emphasis has been on the relationship between iconicity and metaphor, not only in language but also in sign languages and co-speech gesture. The goal of the present section is to illuminate the relationship between iconicity and indexicality in gesture. The ways in which metonymic modes arise from indexical modes, and interact with metaphoric modes, in gestural communication will be introduced here and illustrated in section 3 of the present chapter as well as in chapter V. While previous gesture research has not paid much attention to these interrelations, I will try to show that without accounting for these fundamental semiotic modes, and their various forms, functions, as well as their interaction, the meaning-making processes in the data cannot be fully described and understood. In the sections below, I will continue to weave together the different theoretical threads laid out above (Peirce, Jakobson, and Cognitive Metaphor Theory) and take them a step further, by elaborating on sub-types of iconicity and on indexical modes in representational gestures of the abstract. In this connection, I will further draw on Danaher's (1998) suggestions as to how iconic and indexical elements may collaborate in the mediation between the conceptual, linguistic, and environmental planes of cognition and communication.

4.1. Nesting relations of semiotic modes: Icons and indices in symbols

The way Danaher (1998: 181) describes the nesting relations of the different modes of sign-object relations, namely by comparing them to Russian dolls, is helpful in the sense that it stresses the fact that symbol comprises both icon and index (the former being the primal element).

[[[icon] index] symbol] [[[image] diagram] metaphor]

This is nothing new per se, but to my mind, it calls attention to the intricacy of icon and index, as well as to the relationship between diagrammatic iconicity and indexicality and consequently between iconicity and metonymy. It is indeed difficult to put one's finger on the nature of these relationships, but it seems to me that some aspects of indexicality come into play in the diagrammatization of icons which then feed into the image schemata that Johnson and Lakoff introduced. Similar semiotic principles seem to play a role in gestural sign constitution (which I alluded to in the Jakobson/cubism section), where the essential properties of an object or action are abstracted and represented in a schematic (and at times diagrammatic) way. As icons are supposed to be contained in indices, we can ask how image-schemata are contained in indexical symbols, e.g. in metonymy. Does metonymy (i.e., synecdoche) underlie the creation of those abstract schemata which only show some of the most essential features of an experience? We know that image-schemata are in a certain sense diagrammatic, exhibiting relations of parts to a whole (Johnson 1987). Yet since diagram and

indexicality both belong to secondness, how can we explain the relationship among these phenomena and bring metonymy into the picture?

The table below shows the different levels of semiotic modes we have been discussing thus far.

Table 5: Different levels of semiotic modes and types of argumentation

	<i>sign-object relationship</i>	<i>types of icons</i>	<i>types of argumentation</i>
<i>Firstness</i>	icon	image	abduction
<i>Secondness</i>	index	diagram	induction
<i>Thirdness</i>	symbol	metaphor	deduction

As we can see, index and diagram are both part of secondness, the realm of actual instantiations of qualities, the realm of individual facts. What also becomes evident via this kind of ordered representation is that both image and diagram (schema) reside in metaphor, and both icon and index reside in symbol. Also, we should not forget that, as Danaher puts it, image schemata and conceptual metaphors are the result of abductive inferences, translations of one thing in terms of another, and can be fleshed out differently, which leads to new ideas and connections. They are, despite their general cognitive aspects, subjective modes of interpretation (Danaher 1998: 197).

While stating, as many linguists had before, that iconicity is the leading principle of language structure, Danaher comes to offer the following way to weave *indices* into the tissue of semiotic modes at work in language:

Since all symbols contain iconic and indexical elements, **image-schemas** are the **interpretive result of sensuous experience (icons)** and **interactive responses to the environment (indices)**. They are conceptual gestalts which are organized in terms of the semiotic structure of all conceptual phenomena (e.g. conceptual metaphors and linguistic propositions). [...] Given a Peircean understanding of experience and the iconic symbol as a mediating structure between experience and human conceptualization, it comes as no surprise that iconicity should be a leading principle of language structure at all levels. At a semantic or pragmatic level successful communication requires **icons** grounded in common human experience as well as **indices** which point to known objects in an extra-linguistic realm. This is what Peirce meant when he wrote (CP 2.278) that communication of ideas is impossible without icons. (Danaher 1998: 191; bold face not in original)

Following this rationale, it appears that indices ground interpretative processes in interactive responses to the environment. As we said before, gestures are per se indexical; they are, and often result from, interactions with the physical environment (or, non-linguistic realm). Representational gestures reflect abstractions of object manipulation and other actions that are only alluded to in schematic gestural representations. However, the second sentence in the quote above seems a bit vague. I would add that the semiotic structure is conditioned by the semiotic constraints of the medium of representation. Also, communication can remain incomplete and detached from the here and now of the speech event without the use of indices (linguistic and gestural deixis). Indeed, both Peirce and Jakobson maintained

that indices were vital to communication, providing an anchor in a concrete speech event (secondness).

The following understanding of language and cognition, offered by Nesher (1994: 106), opens things up and takes a general semiotic perspective which is also appropriate for the study of co-speech gesture:

Human cognition is a dynamic system of sign processes. Verbal language is a reasoning process consisting essentially of symbols, and we cannot understand its nature and functions in isolation but only in connection with the entire cognitive sign process. This comprehensive process includes, beside the 'language' of reasoning, the 'languages' of perception and action, with the latter languages consisting essentially of icons and indices respectively. [...] Only through this extended conception of language (i.e., semiotic), which encompasses all of cognition, can we explain the basic conceptions of representation, meaning, and truth. (Nesher 1994: 106).

Communication in the broader sense of the word does include body language, and we can assume that gesture is one of the 'languages of perception and action' 'consisting essentially of icons and indices' that Nesher refers to. As we have observed already, the gesture data exhibits iconic, metaphoric and indexical gestures – while gesture generally is, compared to language, to a greater degree iconic and indexical than it is symbolic. That might be one reason why speech and gesture can be produced at the same time: speech and gesture work in concert, and the global meaning of a message is often derived from semantic information distributed across both modalities, thus imparting a more complete picture.

Danaher too argues in favor of making sense of the icon in a more general semiotic system, namely in relation to indexical (contextual) and symbolic (conventional, habitual) elements. This is not new either, yet useful in bringing together Peirce, Jakobson, and cognitive metaphor theory. Danaher further discusses the role of icons and indices within symbolic propositions, where the temporal and spatial relationship between one sign and its 'neighboring' signs seems to be vital (Danaher 1998: 184). This observation suggests a link between iconic symbols (e.g., lexical items such as verbs and full nouns) and indexical symbols (e.g., grammatical items such as demonstratives, personal pronouns, etc.). Danaher talks about the puzzle that needs to be solved in the interpretation of ICONS (groups of pieces) and INDICES (the contiguity or contextualization of pieces exhibiting part-whole relationships) that make up linguistic propositions.

To be understood, a symbolic linguistic proposition must bring together indexical elements which point to objects in a reality shared by the speaker and listener, as well as iconic elements which are composite (general) images grounded in common human experience. (Danaher 1998: 185)

Let us consider two linguistic examples:

'It rains.'

- | | |
|----------|---|
| 'it': | indexical symbol; points to the current situation |
| 'rains': | iconic symbol; evokes composite mental photograph |

'This is blue.'

- 'this': indexical symbol; something in the context is brought into focus
- 'blue': iconic symbol; general idea / mental images of blueness (p.185)

These sentences express, in my opinion constellations, similar to Peirce's own example when he talks about the indexical character of demonstrative pronouns and the real connection between the mind and the object they establish (Peirce 1955: 14; cf. chapter 1, section 1). Demonstratives and other deictic expressions (indexical symbols, most of which belong to the closed-class of function words) seem to secure the contextualization not only in terms of the social and physical environment; they also form the glue between full nouns, verbs, adjectives, etc. (iconic symbols, most of which seem to belong to the open-class of content words). These phenomena can be linked to Jakobson's theory of metonymy as a sub-category of indexicality. As pointed out earlier, deictic (indexical) and closed-class elements are missing in patients with contiguity disorder (which entails the loss of metonymic modes), but not in patients with similarity disorder (which entails the loss of metaphoric modes; cf. Jakobson 1956, see also chapter I, section 2 on Jakobson).

I would like to stress the fact that, given the balanced interest placed here on both metaphoric and metonymic modes in co-speech gesture, the notions ICON and INDEX occupy an equally relevant place in the theoretical framework of this dissertation. In gesture, as in language, not only iconic but also indexical elements provide grounding in the here and now of the speech

event. In the data, the subject matter is, among other things, the structure of 'symbolic linguistic propositions,' the gestures are thus about propositions as in the ones given above, and both linguistic propositions and their gestural representations exhibit a combination of gestural icons and indices (and metaphors based on icons). Let us look at them one by one to illuminate the semiotic/pragmatic functions they perform.

4.2 Icons (and metaphors) in gesture

In gesture, ICONS can be, as we have seen above, said to motivate iconic gestures of concrete objects and actions, as well as metaphorical gestures referring to abstract entities. Put differently, *iconicity* (similarity) resides in various types of representational gestures both iconic and metaphoric (as pointed out by McNeill 1992, Sweetser 1998, Cienki 1998, among others). Also, given Danaher's (1998) claim that image-schemata and conceptual metaphors are non-propositional cognitive symbols, ICONS can be said to motivate expressions in both modalities, with each modality representing certain aspects of the global message, respecting the semiotic constraints and affordances of each medium.

Articulated in Peircean terms, the gestures under investigation here possess a heavily iconic base, and are thus clearly motivated by the object they represent. In the case of a metaphorical interpretation, the sign is motivated by the object that is used to evoke some kind of parallelism. Whether these gestures represent something concrete or abstract, iconicity is the dominant semiotic mode that drives their production and interpretation. In the

following sub-sections, I will discuss the major modes of iconicity I was able to discern in representational gestures in the data. As most of the meta-grammatical gestures refer to abstract phenomena, they are essentially metaphoric in nature; yet they may, as I will illustrate below, exhibit various combinations of layered iconic modes (image, diagram, metaphor). My aim here is to show that some of these not so widely-used sub-categories put forward by Peirce are apt to capture fine distinctions regarding the different types of iconic relations between gestural signs and denoted concepts.

4.2.1 Modes of iconicity in metaphorical gestures

The array of potential meanings (or, *interpretants* according to Peirce) of a given gesture can range across different domains of experience, and in order to determine whether a given gestural sign refers to a concrete or abstract phenomenon we need the support of the linguistic and often also the extra-linguistic context. For instance, a gesture that consists of two open hands seemingly holding an elongated object between them (e.g. two hands with palms facing each other) can depict a concrete object such as a box, or it can refer through a metaphorical interpretation to an abstract entity such as a noun or a sentence. This is also why looking at the data with the sound suppressed would not add much to the analysis, or understanding, of such gestures. While the iconic aspects could be discerned, the meaning of such polyvalent and unconventionalized forms could not be determined without the speech content. This is even more obvious with respect to the metaphorical leap that is entailed in the interpretation of metaphorical gestures.

Gestures can thus portray iconic object-sign relationships, representing concrete objects or movements by tracing the pertinent features in the air. Or, such a representational gesture can express a metaphorical object-sign relationship. Another example of the latter would be a gesture that traces the frame of a theory, in the same way that it might trace the frame of a painting. Used non-metaphorically, the gesture can be interpreted as referring to a spatial, physical structure by rendering certain parts of that structure (e.g., the essential panels of the frame itself, not the other elements that hold the painting in place). However, in the case of this metaphorical interpretation, the gesture is interpreted with respect to the metaphorical concept that conceptual structure is physical structure. Thus, what might seem to be, in terms of form, the same gesture can be contextualized in two very different ways and achieve two different meanings: A) as a literal depiction of certain properties of a concrete object, or B) as a metaphorical depiction of certain properties of an abstract, conceptual structure that are conceptualized as exhibiting parallels with this concrete object. This tight interaction of the two semiotic modes – the metaphorical and the non-metaphorical – shows us once again that gesture categories are not mutually exclusive (Bouvet 2001; Calbris 1998, 2002; McNeill 1992; Parrill & Sweetser 2004; Sweetser 1998).

In essence, what is common to all the gestures I am examining is that they are part of a metaphorical domain. An analytical necessity I see here is to identify the exact ways in which iconic modes contribute to differentiating the domain of grammar. Accordingly, and in line with the gesture research on iconicity and metaphor presented above, I will discuss both the iconic aspects of these gestures and their potential literal and metaphorical interpretations.

The point I would like to make here is that the examples from the data represent some of the nesting relations of the different types of iconicity established by Peirce. As these modes have been defined and discussed in detail above, I will not do so here. Rather, I will, adhering to Peirce's nomenclature, give examples from the data for each of the iconic modes that seem to be at work within metaphorical gestures representing grammatical phenomena.

- A) Image iconicity
- B) Diagrammatic iconicity
- C) Metaphor iconicity

A) Image iconicity

In the case of image-iconic gestures of concrete entities, the object determines to a great extent the form the sign takes (firstness). An example of this kind of direct, yet schematic, gestural imitation is a gesture, mentioned above, that draws the outline of a picture frame in the air by tracing a sort of rectangle. In a literal / iconic interpretation, the rectangle traced in the air has some similarity with the outline of a picture frame it might represent, and it can also be interpreted as the framework of a theory, with the frame being a metaphor for theoretical constructs.

A prototypical example from the data is the already shown OBJECT gesture consisting of two hands facing each other, appearing to hold an object between them. It occurred in the first examples ('grammar is not a thing') and also in the example shown in the methodology chapter ('passive flip-flop'). The way the hands are being held is similar in certain ways to certain parts of

the box that they are depicting, or, we can also perceive the similarity in relation to the action of holding a box between two hands (a difference that will be discussed in detail below). At the same time, the object/box itself can be a metaphor for an abstract entity, which is the case here, since it receives a metaphorical interpretation in the context of the meta-grammatical discourse. The point here is that the object that represents a single abstract entity, for example a constituent, is an example of *image iconicity within metaphor*.

To demonstrate these phenomena, let us look at the 'passive flip-flop' sequence once again, this time with a focus on the semiotic modes that appear to be at work in the image-iconic representations of both an abstract action and an abstract object. Here is the same transcript that was provided in the previous chapter:



(4) ((*flip-flop passive*))

G1

bh & arms vertical, cross-over
[The passive basically flipflops _]

G1 being held

the subject and object of the sentence. \
a=nd _

G1 still being held

(...) what we find out by forming this particular passive], _

G2

a

b

c

bh, pcoh-box, object gesture – held, move up and down
is [that the string 'John's sister' forms a constituent.]

d e
still held, move up and down
namely the object of the verb. \

f

still held, move up and down
(...) and that's an object noun phrase] in fact. \

As pointed out already, the speaker crosses over her forearms (after first having them held vertically, shoulder-width apart, G1). This physical action represents, *iconically*, the switching of two things. It stands, *metaphorically*, for the abstract action of 'flip-flopping' two elements in a sentence, here referring to the inversion of subject and object as it is entailed in the syntactic operation of passive transformation (according to the generative grammar framework).

Figure 7 below shows the end point of the crossing gesture:

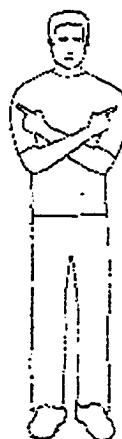


Figure 7: Active-passive flip-flop of constituents

After the stroke on the verb 'flipflops,' the cross-gesture is being held while the speaker keeps explaining the kind of syntactic operation involved. She turns her torso rightward towards the overhead screen behind her, walks briefly towards the screen, then turns back and finally faces the audience again. Only then her arms open up again and merge right into the next gesture (G2): both open hands being held more than shoulder width apart and facing each other (see Figure 8 below). This is thus an example of the already discussed and frequently-found gesture reflecting a parallelism between the

abstract notion constituent and an object. Put differently, it represents the metaphorical concept AN IDEA IS AN OBJECT, materialized in the gesture modality.

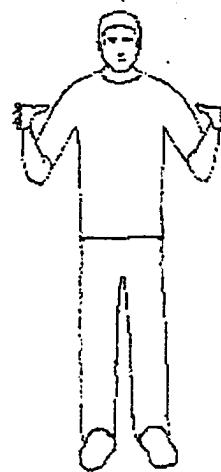


Figure 8: A constituent as a physical (imaginary) object

In fact, we observe a metaphor mismatch between the speech and the gesture modality: Although the constituent 'John's sister' is linguistically described as a string, the concurrent gesture clearly depicts an object (G2) and not a string. This gesture is also being held over an extended period of time, in this case with built-in beats (marked by letters a-f in the transcript), aligning rhythmically with the prosody in the speech modality, until the hands retract to fists. In the data, variants of this gesture were found to refer in terms of bounded spaces to linguistic entities of different complexity (categories, morphemes, words, phrases, sentences, discourses etc.).

B) Diagrammatic iconicity

Diagrams are icons of relations (secondness). Besides representing things in the real world, such as streets and monuments on a city map, diagrams are also used to represent relations of items within abstract domains. For example, a line is drawn from left to right in front of the speaker, representing a sentence simply as a horizontal string is an instance of *diagrammatic iconicity within metaphor*. I will provide only one example of diagrammatic iconicity here, as the following sub-section is devoted to different sub-types of diagrammatic iconicity as discerned in the data.

When explaining dependent clauses, speakers employing the generative grammar framework tend to use the right hand to sketch a branch extending toward the lower right of their body. Example (5) below shows a diagonally descending line that is meant to represent an embedded clause. The speaker stresses the idea of subordination (G1 below) by repeatedly moving her right hand first up to eye-level and then downward to her right side, thereby making a wave-like movement by tilting the hand from side to side. This can be assumed to roughly imitate the process of going down along the different nodes and branches of a tree structure.



(5) ((*wavy embedded clauses*))

G1 (G1 repeated) (G1 repeated)
rh diagonal wavy line from head downward to the right

... [but this is gonna be another one with embedded sentences]

(G1 repeated) G2
 rh extended arm and index finger
 point toward ground
coming in **verb** phrases] [all the way down].

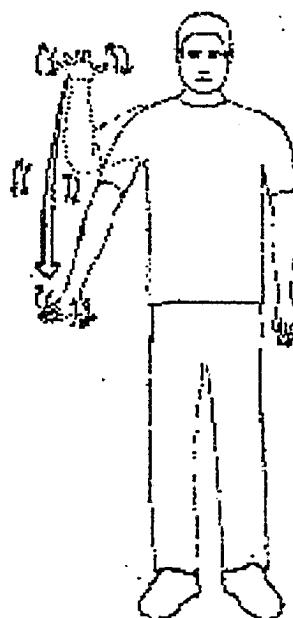


Figure 9: An embedded clause as a wavy diagonal line

Through the consecutive gesture (G2), we learn that there are certain cases in which embedded sentences go 'all the way down.' At that point the speaker extends her right arm towards the floor and points with her index finger straight to the ground (as shown in Figure 10 below).

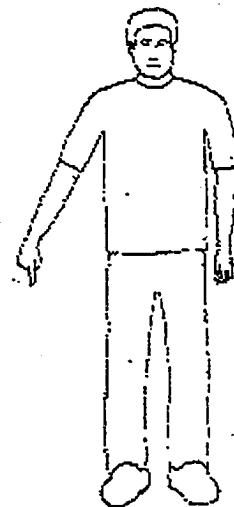


Figure 10: An embedded clause as a diagonal line 'going all the way down'

Both lines drawn in the air, the first in a non-linear and the second in a linear fashion, evoke a schematic/ diagrammatic image of the idea of subordination, and neither conveys, literally, the tree structure which consists of a branching structure (in the form of triangles) with straight limbs.

C) Metaphor iconicity

The third type is more complex and not as easy to identify, since we are dealing with *metaphor iconicity within metaphor* – and thus with an extremely high level of abstraction (thirdness). As linguistic theories are often built on a specific set of metaphors, we can, in fact, identify interactions of metaphorical understandings. For instance, generative grammar makes use of spatial hierarchies and power concepts at the same time. Let us look again at the subordination gesture (G1 in example 5) which, as we just saw, represents the notion of embedded clauses as a wavy line descending in a diagonal down

toward the floor. As a matter of fact, the corresponding model of sentence structure proposed within generative grammar is already a blend of several metaphorical concepts, namely of physical spatial structures (standing for conceptual structure (tree structure)) on the one hand, and for power relations (dominance, subordination, etc.) on the other. Put in Peircean terms, different parallelisms between the abstract domain and the sign are evoked and brought together. An interesting question that arises here is whether or not both metaphorical understandings come through in the gesture modality. As a matter of fact, in this example only the idea of 'embedded clauses' is mentioned in the concurrent speech, relations of dominance are not alluded to. In the gesture modality, only a spatial understanding is conveyed: a line traced in the air reflects, in an admittedly sketchy way, the downward branching structure of a tree diagram, and the idea that 'sub-ordinated' entities are thought of as below the ones that dominate them.

Let us look at another example, where the same speaker actually makes reference to the idea of dominance in the speech modality. The speaker draws a triangle in the air, with both hands starting out at center top, the node, and tracing diagonals outward and downward to either side of the body. It is a gestural depiction of technical terms (nodes alpha and delta, dominate) that taken by themselves do not entail spatial understandings per se. Only when the speaker realizes that she has not yet introduced the idea of 'dominance' does she resort in the speech modality to the solely spatial understanding of a node being on the top of two branching limbs. Although, in the speech modality, there is, for a moment, a slight hesitation about which metaphorical

model to refer to, the gesture modality consistently represents the spatial properties of the tree model.



(6) ((branching, domination))

... No=des, /
alpha and delta, /

G1 bh, branch triangle, branching movement x2
[branch, \ (...7)]
okay? /
so that's a technical term, _

G2 bh, triangle
(.) [when the nodes]--, /

G3 rh branch G4bh triangle, branching movement x2
[a node] [dominates--], /
(..) woops I said a technical term too soon,

G5 rh draws triangle G6 bh triangle branching
(..) when [the node is on top] [of two things] or more, /
(..) it branches... \

Figure 11 below represents the very beginning of the, repeatedly used, branching gesture when the hands are joined at the top (the node) of the triangle, before they move downward to reinforce the idea of an active branching process. The geometric configuration is evoked in two ways: either by the two arms held diagonally (as illustrated in the figure below), or by drawing a triangle in the air with the index finger. Both representations are direct imitations of parts of the tree diagram. We will examine these diagrammatic modes within metaphor in more detail below.

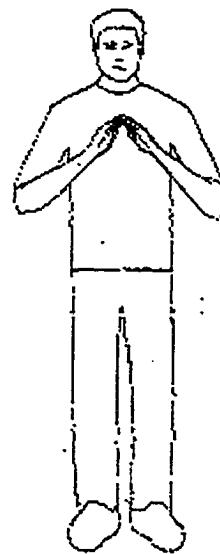


Figure 11: Sentence structure as a laterally branching tree chunk

This section exemplified each type of iconicity in metaphoric gestures. More examples of theoretical views that are expressed in the gesture modality (e.g. relational grammar and emergent grammar) will be provided in chapter V).

4.2.2 Modes of diagrammatic iconicity in meta-linguistic gestures

As we have seen, the different semiotic modes are usually layered in a given sign or combination of signs. It is thus to be expected, and has been pointed out above, that diagrammatic iconicity also comes into play. Language, the subject matter of the academic discourse under investigation here, entails, as Danaher (1998) points out, the "re-recognition of relations embodied by grammatical facts" which organize themselves – via habitually and conventionally driven interpretation – into patterned relations. As we have seen in the section on iconicity in language (chapter III), language structure

tends toward coherent patterning in the diagrammatization of form/content relations. This again raises the question of diagrammatic iconicity and cognition. Since diagrams use space as a medium to visualize relations among entities (whether spatial, functional, hierarchical, or yet of a different kind), they are instances of the spatialization of abstract information, evoking spatial dimensions of abstract entities and structures. As discussed earlier, diagrammatic / isomorphic iconicity resides to different degrees in the lexicon and in language structure.

The iconic diagram underlying sentence structure is, following Peirce, an icon of relations, e.g., the similarity between sign and object is of a relational nature and not necessarily sensory. Nevertheless, gesture can make abstract relations visible and graspable, by depicting word and sentence structure in a spatial way that would pose a challenge to linguistic description. As I will show in this section, gesture diagrams can be created on the fly, or they may imitate conventionalized diagrams that already exist in another visual modality (such as tree structures representing language families; or, kinship relations cf. Enfield 2003).

I would like to propose that there are at least three different modes of diagrammatic iconicity in meta-grammatical gestures:

- A) image-iconic diagrams
- B) relational diagrams
- C) structural diagrams

A) Image-iconic diagrams

Gestural diagrams of this sort are direct reflections of conventional diagrams as found in books (e.g., tree structure diagrams, relational grammar diagrams, etc.). The object-sign relationship (diagram-gestural sign) can thus also be described as (image) iconic.

As has been noted in the discussion of the previous example, tree structure diagrams tend to be reflected in gesture in a fairly direct way. One way in which the tree is repeatedly embodied in the data is illustrating the branching process by forming a triangle with hands joined at the top, elbows extended to the sides, and both forearms held diagonally. In the next example, we see similar triangular hand/arm configurations and movements that reinforce the idea of an NP (e.g. consisting of a determiner and a noun) branching out to the left (where the determiner goes) and to the right (where the noun goes) respectively. The evoked pyramid stands for a tree chunk (i.e. a triangle), and in this case even the base of the triangle is traced, thus evoking the line of words that are to be imagined to appear, in a certain order, at the bottom of the structure.



(7) ((*tree chunk, top, order branches*))

```

... Tree trunk, \
(... a noun phrase, \
(..) which branches to determiner on the left, /
(..) and, /
nou=n, -
on right, \
(..) so basically, \

```

(..) the left side of the rule, _
 tells you, /
 (..) the category that's on the *top* of your tree trunk, /
 (...) and, /
 the right side of the rule tells you, /
 (...) what it branches out to, _
 (...) and the *order*, /
 in which those branches occur... \

The drawing below (figure 12) shows only the first stage of the branching gesture that involves movements down to the side, along the diagonals, and not the representation of the two elements the structure branches out to. Also, the tree structure drawn on the board visible behind the speaker make the resemblance between it and the gestural imitation even more vivid.

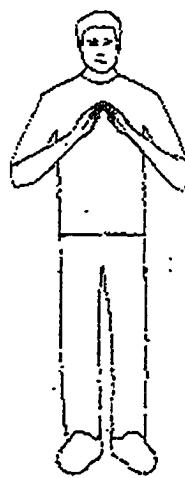


Figure 12: Sentence structure as a laterally branching tree chunk

Such gestural reflections of conventional sentence diagrams (not only those used within the generative grammar paradigm) exhibit a high degree of isomorphic iconicity (Haiman 1985; Jakobson 1971; Waugh 1992) and

exemplify what could be thought of as a hybrid between image and diagrammatic iconicity.

B) Relational diagrams

The second category proposed here contains ad hoc diagrammatic representations created on the fly when referring to word, constituent, or sentence structure. Although such schematic representations may be based on written representations of linear arrangements of words, they are nonetheless more schematic than written/printed sentences. The function of a linguistic unit may result from its specific location, or from its relation to other elements in a sentence, e.g. how items are combined (Jakobson: adjacency, contiguity, external metonymy / metonymy of place). These representations bring out the relational nature of word and sentence structure; the diagrams, e.g., 'grids' that are 'hidden' in sentence structure (the more abstract, less obvious type of iconicity in morphology and syntax). There are several ways of depicting relations, two of which will be illustrated below (G1).

Within the abstract (metaphorically accessed) domain of grammar, an ad hoc diagrammatic representation of sentence structure can be a hand movement indicating the combination of units into a sentence by tracing the horizontal alignment of words from the left to the right of the speaker. Or, as in example 8 below, the gesture starts out with two hands joined at center, then moving laterally outward until both arms are fully extended, as if they were tracing a line, e.g., a string or chain of words.



(8) ((string of words))

So how do we know which complex syntactic units make up English sentences?

G1

bh lateral horizontal outward movement

so [we think of a sentence as a string of words ...]

G2

a b c

d

Bh sketchy objects, along the string (bracketing)

it's [obvious that we can group the words together in various ways].

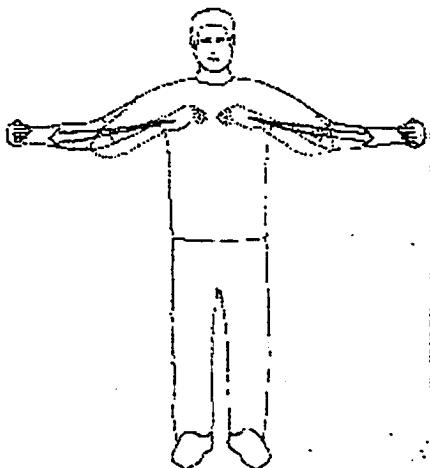


Figure 13: A sentence as a string of words

With the next gesture (G2), the speaker then seems to group elements with both hands drawing boundary-like contours of objects/containers in a rather sketchy way along the previously set-up imaginary string (or path), moving from the center to her right (the letters a-d symbolize the fact that the speaker repeats the same gestural configuration). The designated spaces between both

hands seem to overlap as the hands move to the right. This might have to do with the fact that the speaker had just explained 'bracketing', a classification system according to which sentence elements are grouped into constituents marked off by brackets that can encapsulate other bracketed constituents.

We can say that the schematic graph above stands for a fleshed-out sentence through a part-whole relationship (synecdoche), and that the representation of abstract structure in terms of a concrete visual sign (a graph on paper or a gestural diagram) relies on a metaphorical relation between sign and object. At the same time, there is a part-part relationship between the groups of words – alluded to by the bracketing gesture – that make up a sentence, as well as a part-whole relationship between the parts and the entire sentence.

In the following example, we can witness a different illustration of the relation holding between words ('the teacher') and also between morphemes within words ('teach-er').



(9) ((*the teach-er*))

...our understanding of this is as speakers of English you know

G1 G2 G3

[that **the teacher**] consists [of **the**] [and **teacher** (...)]

G4 G5 G6
and [**teacher**] [consists of '**teach**'] [and '**er**']

G7
[NOT]

G8 G9 G10 G11
[the teacher con]sists [of the] [and teach] [and er].

In this sequence, two different semiotic modes are instantiated: first, the depiction of morphemes as small imaginary objects, and second, the relation between them. The speaker accentuates almost each mention of a morpheme with a similar relaxed palm up open hand gesture starting at shoulder level and pulling down to the waist. Towards the end of the explanation he seems to grasp small objects and then hold them in his closed fists (G9, G10, G11). The fact that he executes gesture G9 (on 'the') with his right hand and both G10 ('teach') and G11 ('er') with his left hand highlights that G10 and G11 refer to two morphemes forming one single word. This is where the diagrammatic / relational aspect resides: the two adjacent hands representing together the internal structure of the word 'teach-er'. In the same process, linguistic units are thus reified (via metaphor) and made understandable, by iconically handling small imaginary objects.

Diagrammatic gestures thus tend to bring out the abstract, structural underpinnings of a sentence or a theoretical model of a sentence, that is to say, the organization rather than the content. It is thus a visual rendition of relational iconicity which spoken language cannot provide. Hence, the literal translation of the source domains of metaphorical mappings and other concrete entities into a set of gestures or gestural diagrams permits us to see the diagrammatic structure of language in spatial terms

C) Structural diagrams

In this category, the focus is not on the relation between signs, but on the principles of sign constitution in certain gestures: salient features of an object (e.g., a box, a picture frame, or a pair of glasses) or an action/motor program (e.g., opening a bottle, chasing an animal with an umbrella) are extracted/abstracted from the holistic gestalt. As such, representational gestural signs still evoke the similarity between the object and the sign, but they are much more abstract than in an image. Essentially, the relation between the parts within a whole that are manifest in the object are preserved in the gesture, as is the temporal sequence of stages that make up an action. These observations support what Johnson (1987) and colleagues maintain concerning the internal structure of image schemata (Danaher 1998) and, to a certain degree, with what Taub (2001) understands by the schematization of images in the process of ASL sign creation.

In the following example, several of the semiotic modes and gestural forms discussed so far work together in rendering the complex idea of a constituent that contains another (sub-constituent); that one can reach into the super-ordinated constituent to pull out the sub-constituent. It should be noted that the OBJECT gesture is only one way to refer to abstract entities. There is a distinction made between solid objects that may represent abstract entities and a *container* with an explicit inside. In the example below, the gestural description (see ex. 10 below) alludes only indirectly to the existence of a container in that the container is not represented via gesture, yet it

metaphorically provides an imaginary constituent space *into* which the speaker seems to *reach* to *pull out* a sub-constituent:



(10) ((*reach into constituent*))

G1

... [so 'invite John's sister' is a constituent]

G2

[but we can *reach* into it]

G3

[and *pull out* a sub-constituent (...)].

Gesture G1 is a subtle indication, achieved with the extended little finger of the right hand used as an index, pointing out that 'John's sister' indeed is a constituent. In G2, both hands, palms facing each other and forming a space between them, are moved from center body to the lower right side of the speaker, and then, maintaining the same configuration, are pulled up again (G3) towards the center. The gesture stroke coincides with the mention of manual actions (to *reach into* and *pull out*), and the gesture iconically represents these actions that stand for the manipulation of abstract concepts. The idea of a *sub-constituent* is emphasized by the fact that the hands reach downward into the imagined container and pull back up with a sub-constituent held between both hands. The super-ordinate constituent is thus minimally evoked, and the sub-constituent being pulled out of it has, relatively speaking, more substance to it. What is important here is that the motor program of reaching into a bounded space and pulling something out is imitated by its essential characteristics and that there is a part-whole relationship between the two phases of the schematically represented action. This type of diagrammatic

iconicity is probably the least obvious one, but in light of Peirce's theory and Danaher's (1998) discussion of it, the diagrammatic properties of certain gestural signs are striking.

Although, generally, diagrams may take all kinds of forms and dimensions (subway maps, topographical maps, family trees, float charts, simple lines, etc.), what all these diagrammatic modes have in common is that they evidence the capacities of abstraction of the human mind motivating such spontaneous, schematic, representations of relations between objects and actions (as well as their interpretation / recognition) in the gestural modality. I submit that it is not only a matter of spatialization of information, but that it may also be a matter of geometrization of abstract information into basic forms and configurations that allows the human mind to readily seize (grasp) and manipulate them (Arnheim, Zeki). As we will see, these geometric patterns reflect to a certain extent some of the image schemata proposed in the cognitive linguistics literature (as well as some of the forms found in Cubism). As I will show in more detail below, comparing the semiotic nature and functions of diagrammatic icons, image schemata, and geometric patterns does seem to be legitimate and worthwhile, at least in view of the present data. The fact that grammar (and its categories and ordering principles) and language (mostly in form of written words, clauses and sentences) are the subject matter of the multimodal discourse under investigation here clearly influences the kinds of gestures that are produced. In other words, the object can be assumed to determine the sign(s) to various degrees (Peirce).

As a matter of fact, Jakobson, in his essay *Poetry of Grammar and Grammar of Poetry* (1987: 121), asserts that the abstractive power of thought is at the root of both grammar and geometry. Comparing the role of grammatical ordering principles in poetry with the role of geometrical principles in the visual arts, he makes an interesting correlation with the dichotomy between lexical and grammatical aspects of language (content words vs. function words) alluded to above: "Despite some borderline, transitional features, there is in language a definite, clear-cut discrimination between these two classes of expressed concepts –material and relational—or, in more technical terms, between the lexical and grammatical aspects of language" (p. 122). These observations remind us of Jakobson's distinction between similarity disorder and continuity disorder on the one hand and of Danaher's exposition of the difference between icons and indices in linguistic propositions on the other.⁴³

Another connection Jakobson draws, one which I find particularly inspiring, concerns the distinction between "figure of grammar" and "figure of thought" (p. 124, with reference to Hopkins), or, according to ancient and medieval theories of poetry, the distinction between "grammatical figures" and "lexical tropes" (p. 127). In relation to visual representation, Jakobson further sees

[...] a remarkable analogy between the role of grammar in poetry and the painter's composition, based on a latent or patent geometrical order or a revulsion against geometrical arrangements. For the figurative arts, geometric principles represent a "beautiful necessity," according to the designation taken over by Bragdon from Emerson. It is the same

⁴³ It should be noted here that there is increasing evidence, especially from the field of corpus linguistics, that grammar and the lexicon interact in an intertwined relation, referred to with notions such as lexico-grammar, phraseology, lexicalization, etc.

necessity that in language marks out the grammatical meanings. (Jakobson 1987: 132/133).

These correspondences emerged in the works of Spinoza and later in Whorf's work (*Language, Mind, and Reality*, 1942). The latter discussed "the abstract 'designs of sentence structure' as opposed to 'individual sentences' and to the vocabulary (regarded as a 'somewhat rudimentary and not self-sufficient part' of linguistic order; he envisioned a ""geometry' of form principles characteristic of each language" (Jakobson 1987: 133). Further insightful comparisons between grammar and geometry were made by I. Stalin (against Marr's linguistic bias), postulating that the distinctive property of grammar lies in its abstractive power:

abstracting itself from anything that is particular and concrete in words and sentences, grammar treats only the general patterns, underlying the word changes and the combination of words into sentences, and builds in such a way grammatical rules and laws. In this respect *grammar bears a resemblance to geometry*, which, when giving its laws, abstracts itself from concrete objects, treats objects as bodies deprived of concreteness and defines their mutual relations not as concrete relations of certain concrete objects but as *relations of bodies in general*, namely, *bodies deprived of any concreteness*. (Stalin as quoted in Jakobson 1987: 133; italics not in the original)

Jakobson elaborates these ideas as follows:

The abstractive power of human thought, underlying – in the views of the two quoted authors – both *geometrical relations and grammar*, superimposes simple geometrical and grammatical figures upon the pictorial world of particular objects and upon the concrete lexical 'wherewithal' of verbal art, as was shrewdly realized in the thirteen century by Villard de Honnecourt for graphic arts and by Galfredud for poetry. (Jakobson 1987: 133; italics not in the original)

To come back to the particular functions of pronouns (indexical symbols, according to Danaher), they may be compared, according to Jakobson, to geometrical figures:

The pivotal role performed in the grammatical texture of poetry by diverse kinds of pronouns is due to the fact that pronouns, in contradiction to all other autonomous words, are purely grammatical, relational units, [...]. The relation of pronouns to nonpronominal words has been repeatedly compared with *the relation between geometrical and physical bodies*. (Jakobson 1987: 133; italics not in the original).

In light of the excursus just undertaken, I would like to sketch out some of the connections I see between grammar, geometry, and gesture. First of all, the comparison of ordering principles in language (poetry) and visual representations (paintings) confirms in a way some of my deliberations about potential commonalities regarding metonymic modes as structuring principles in Cubism and gesture.⁴⁴ Second: Jakobson's discussion is interesting in view of the geometric tendencies of the schematic images that have emerged as salient patterns from the gesture data (to be discussed in chapter 5). Third: not only is the distinction between lexical items and grammatical items is useful (as alluded to above, there seems to be a tendency for gesture to accompany 'shifters': pronouns, demonstrative pronouns and adjectives, etc.), but also the distinction between lexical tropes and grammatical figures. It seems then that lexical tropes can be related to icons, and grammatical figures can be related to indices/metonymy, both of which seem to motivate, in various ways, visual

⁴⁴ Although we are not directly interested in poetry here and cannot go into detail either, it is worthwhile considering that Jakobson (1987: 134) talks about geometrical patterns: vertical and diagonal similarities of grammatical features in stanzas, as well as about falling and rising diagonals, higher and lower upright arcs, inverted arcs, etc.

representations in the gesture modality. Here a difference exists between gestures that provide images of single items on the one hand and those gestures that evoke relations between single items and/or provide contexture for them. In other words, the first type of sign (e.g., (image) icons) is selected to represent the concept in question (e.g., lexical items/lexical tropes/material concepts/physical bodies). The second type (e.g., indices, diagrams) expresses grammatical or spatial relations (grammatical items/grammatical figures/grammatical texture/geometrical bodies/relations of bodies) and thus links separate units into a combination and provides contextualization (contiguity/deixis/adjacency/metonymy).

The ideas of "relations of bodies deprived of concreteness" and of "geometrical and grammatical figures," fits well with the semiotic principles in gesture as well as with the abstractive power that makes all these phenomena possible. In gesture, objects (bodies) deprived of their concreteness are represented, and, at the same time, these gestures are a means of rendering abstract entities more concrete. The gestures in the data are, to come back to Whorf, more about the "abstract designs of sentence structure" than about individual sentences and vocabulary" (diagrammatic iconicity). Seen from this perspective, and with reference to Peirce, schematized (e.g. abstracted/generalized/diagrammatic) gestural representations of grammatical categories and structures embody some characteristics of thirdness.

4.3. Indices (and metonymy) in gesture

As pointed out above, gestures are, in general, inherently indexical with regard to the speech they accompany and also with regard to the physical and social environment the speaker finds herself in. Consequently, a major part of the gestures discussed above can be reread with a focus on their indexical modes (e.g., deixis, metonymy, synecdoche, etc.). In the present data, indexicality (i.e., contiguity) indeed plays an important role in the gestural differentiation of abstract spatial information, and the purpose of the present section is to lay out the most prominent indexical modes found in the data. It is, however, important to keep in mind that the gestures under investigation are essentially metaphorical in nature and that we need to investigate, for each individual sign process, the relative hierarchy between iconic and indexical modes that are at simultaneously at work.

Let us briefly recapitulate the principal relations among signs according to Peirce and see where indexicality is located vis-à-vis the other semiotic modes: iconicity is based on similarity and indexicality is based on contiguity. Moreover, images, diagrams, and metaphor are sub-categories of iconicity, and metonymy is, according to Jakobson, a sub-category of indexicality (as in deictic expressions and pointing gestures). Icon and index thus yield metaphor and metonymy respectively. One of the main goals of this dissertation is to show that there are, besides synecdoche, additional sub-types of metonymy at work in gesture.

With these objectives in mind, let us revisit the object gesture that occurs frequently in the data, mostly used to refer to an abstract idea as a bounded object (or a bounded chunk of space). In order to evoke the idea of an object it suffices to pretend that one is holding a generic object between both hands (with palms facing each other). It is not necessary to trace each side of the object (say a shoe box) and its exact dimensions. Instead, to represent a box only the two outer sides are alluded to by the constellation of the two hands; the mind has to fill in the rest. Similarly, the picture frame is represented by just tracing the outline of the rectangle in the air; there is no indication whether the surface spanning between the frame is filled or unfilled. These are canonical examples of synecdoche (part for whole); they remind us of the zebra and helicopter examples given above (Bouvet 2001; Eco 1987; Müller 1998). In fact, we can look at the object gesture from yet another angle and realize that the hands can also be taken actually to evoke the action of holding the box, and thus the box itself only in an indirect way. Hence, this can be interpreted as an instance of metonymy, where the action stands for the object involved in the action (I will discuss these issues in more detail and in light of both Jakobson's view and cognitive metonymy theories in the ensuing chapter).

One of the most striking realizations here is that pointing gestures (*deictics*, according to McNeill 1990), which embody the prototypical and most studied type of indexical gestures (Fricke 2003; Haviland 2000; Kita 2003), represent only one of several indexical/metonymic modes in gesture. Deictic gestures may direct the audience's attention to specific locations, objects,

people in the environment of the speaker (concrete deixis); to information on blackboards and overhead screens; or to specific locations in gesture space in front of the speaker which may represent events or objects previously introduced in the discourse (abstract deixis). Moreover, beats that accompany the rhythm of speech can also be said to be indexical with regard to the speech content with which they coincide. They are thus multifunctional, too. Also, gestures that are not representational but rather expressive/emotive (Jakobson 1990), such as a person holding his or her head slightly tilted backwards and "looking down on" someone or something, can be read as being indexical of that person's attitude (e.g., arrogance), mood, degree of involvement in teaching a certain subject matter, etc. This sort of indexicality, as well as conative functions (attract the (continued) attention of the audience, for instance) could not be investigated in detail in this dissertation, but there is still much to be said about these multifunctional dimensions of gesture.

While all the different indexical properties of gesture merit treatment, and many of them have not been researched yet, it should be noted that all of them cannot be covered here. Instead, I will focus on those modes that are particularly important with regard to principles of contextualization and reference in meta-grammatical gestures, that is, to those modes that significantly interact with the iconic modes identified above. The following list represents some of the indexical modes just pointed out plus some additional manifestations of indices in co-speech gesture that I was able to identify. Since there are no sub-categories of indices in Peirce's system, I suggest a typology (drawing partly on Peirce and Jakobson).

Based on what I have observed in the data, indexicality (contiguity) can be discerned at least in the following kinds of phenomena:

- A) Gestures are *inherently indexical* (contextualized via linguistic and non-linguistic context) [INDEXICALITY]
- B) The *formation of the gestural sign* embodies the principle of a sign's partial representation of the object [SYNECDOCHE / INTERNAL METONYMY (Jakobson)]
- C) *Pointing gestures* (deictics); concrete and abstract: pointing to information on board, pointing to locations in gesture space, pointing to the existence of things
[DEIXIS concrete/abstract]
- D) *Contextualization / combination / relation:*
 - gestural movements that link single items (icons) that are contiguous (or adjacent) in a certain way (word/sentence/diagram);
 - relation holding between two adjacent signs produced with two different hands (adjacency)

[structural/diagrammatic contiguity / EXTERNAL METONYMY (Jakobson)] [METONYMY OF PLACE]
- E) *Reference points, indirect reference:* hands guide attention to/provide mental access to object seemingly being held by them. Hand action may

stand for object involved in action; the act of presentation may stand for the presented item [referential EXTERNAL METONYMY (Jakobson)]

- F) *Relation to body parts:* Gestures that derive some semantic features from the body part close to which they are produced
[referential EXTERNAL METONYMY (Jakobson) / METONYMY OF PLACE]

In what follows, I will provide examples for each category, except the first which applies to gestural signs in general.

4.3.1 Gestural sign formation and pointing gestures

- A) Gestures are *inherently indexical* (contextualized, grounded), i.e., always contiguous with the speech event, attesting to an existential relation in space and time with the concurrent discourse, as well as with the speaker's body and its surroundings.
- B) The *formation of the gestural sign* results from the interaction with the physical and social environment. Gestural signs are responses to the ecological context of a person, rooted in movement through space and object-oriented actions and interpersonal interactions. Due to the schematic, partial representation of the object in iconic/metaphorical gestures, they embody the principle of semiotic representation par excellence [SYNECDOCHE / INTERNAL METONYMY (Jakobson)].

Which parts of a concept, or features of an object or an action, are not represented (thus deleted) and which ones are actually depicted seems to be highly dependent on the flow of information (old / new information) and the semantic nuances the speaker wants to express. Although the perspective on the data taken here does not include a fine-tuned analysis of how exactly an idea unfolds and finds expression in the two modalities, the way we have been looking at metaphoric gestures has provided some clues as to how emphasis may be laid on certain aspects of an entity or an action. These preliminary observations correspond with work carried out within the CA (conversation analysis) tradition, suggesting that interactional considerations play a crucial role in shaping what is represented and what is not moment by moment. One can expect that, in the case of a teaching context, aspects of recipient design does condition these mechanisms. While each video sequence is extremely rich in terms of semantic and pragmatic processes and functions, the discussion can only focus, in each instance, on selected features.

As we saw in example 10 (video 8) in the previous section, the trajectory of the reach-in / pull-out movement is important in this sequence, as it went visibly downwards to evoke the idea of a sub-constituent situated at a lower level. In the sequence below, the speaker makes, in a similar fashion, a gesture that refers to the action of moving a linguistic unit around in an elongated sentence space (to be imagined by the audience, since it is not sketched in the air, but rather assumed to be there). In fact the unit, represented again by the OBJECT gesture, is simply slid sideward in the direction of the beginning of the sentence. The exact initial and final position are not indicated.

Video #9(11) ((*moving groups*))

G1 bh container

... what we do is we *check* whether,
this unit, /
this [group, /
can be, /
moved around] in the *whole* of the sentence... \

The image below (figure 14) shows the hands at the end of a sweeping gesture towards the left, with both hands still evoking the OBJECT configuration, yet slightly opening up towards the left of the speaker, that is, pointing to the side where the unit is being moved to.



Figure 14: Moving groups in a sentence

C) *Pointing gestures* (deictics) may indicate the place of an item / person / event in the immediate surroundings of the speaker. They tend to accompany demonstrative pronouns and adjectives (often disambiguating their meaning).

[DEXIS (concrete/ abstract)]

To illustrate and anchor their explanations, teachers often point at information written on blackboards, whiteboards, or overhead screens. An example of this prototypical kind of pointing gesture is given below. Interestingly, the speaker is using both hands, overlapping for a moment, for different kinds of illustrations: he points with his right hand to words projected onto the overhead screen (on the mention of "there is"), and, he produces with the left hand a palm-up cup gesture (on the mention of "the main verb").

 VIDEO #10

(12) ((E VP aux subcategory))

G1 rh, index overhead, lh cup
 ... but there is (...) what's called the main verb, \

(...3) the central verb, \
 and these are (...) various forms of auxiliaries, \
 since they can come here, /
 and we couldn't say instead, /
 for example, \
 (...) have (...) will (...) being (...) *been* (...) dropped, \
 each of these must belong to some sub-category... \

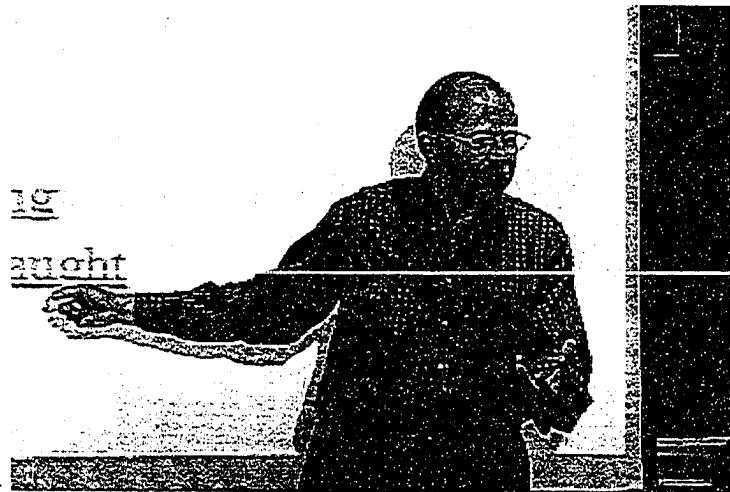


Figure 15: Pointing at overhead screen and cup

The abstract entity of the verb is to be imagined as being contained in the hand, which again reflects a metaphorical understanding of an abstract notion as a concrete object.

Other practices of pointing observed in the data suggest that deictic gestures do not necessarily have to indicate an actual object such as a specific word written on the blackboard. Instead, the speaker might just point out the existence of a certain category or operation. In the very beginning of the sequence showing the reach/pull gesture (reach into constituent, example 10, Video 8), the speaker makes a discrete pointing gesture with the little finger extended (not the index) concurrent with “invite John’s sister **is** a constituent,” thus calling attention to the fact that the words “invite John’s sister” indeed form a constituent. This pointing gesture is produced not in relation to another gesture or in relation to a given object / location, but it is indexical of the idea it refers to and of the concurrent speech content.

VIDEO #8

Figure 16: Pointing out the existence of a category

The next sequence contains a deictic gesture (right hand, index, and middle finger loosely extended) that receives its meaning partly through its relation to the gesture produced by the left hand held next to it. In her explanation of phrasal verbs and the placement of a pronoun vis-à-vis the main verb form and the particle, the speaker points out that the pronoun can only occur between the verb and the particle and not after the particle. The left hand is used as a gestural placeholder for the particle, and the right hand points, as illustrated in the image below, to the place "after" (e.g. next to) the particle where the pronoun is not supposed to go.

VIDEO #11

(13) ((phrasal verbs particle order))

... XXXX,

- G1 rh apportioner
 [using the *it*, /
 or using a pronou=n, _]
- G2 bh pfoh
 [only *between* the verb and particle, _]
- G3 rh measure & trace, lh pfoh
 (...) [not *after* the particie... \]



Figure 17: Pointing to the place of pronoun (phrasal verbs)

It is noteworthy that the speaker represents the order of the different elements so that they make sense from the perspective of the audience ("after" here means to the right of, according to the image of a sentence extending from left to right in front of a person (when writing or reading). The space that the gesture points too is abstract space; the gestural illustrations thus combines a metaphorical understandings of abstract linguistic units as physical objects, their arrangement in space, and indices pointing out the relation (adjacency) of the units. Abstractness here can be seen as relative, since linguistic units can be regarded as artifacts.

Such indexical gestures seem to interact with space and previously made gestures in various ways: they may point to a location in abstract space in which a previous or adjacent gesture serves as a reference point (as in the example just discussed), or they point (in)to a space that is not occupied or was not previously set up by another gesture but is to be imagined as the background for the gestural figuration of specific information. These functions are not unique to pointing gestures, as we have seen in the examples above where the container (in to which the hands seemingly reached) and the sentence space (in which units may be moved around) had to be imagined as two-dimensional delimited spaces.

4.3.2 Contextualization and combination

D) *Contextualization and combination* (contiguity): adjacent items linked together in linguistic signs of different levels of complexity or in a sentence diagram. The fact that single parts are linked together and make up a structured whole is highlighted (conceptual coherence).
 [structural / diagrammatic EXTERNAL METONYMY (Jakobson)]

Within such an ensemble (e.g., a phrase), the specific location of an item (icon), also in relation to other items, can give rise to its function in both linear and hierarchical representations of sentence structure
 [METONYMY OF PLACE].

The combination of items is a key aspect of this study, as the speakers talk a lot about how words, phrases, sentences, and discourses can be broken down into their constitutive elements. As was demonstrated above, in Jakobson's

theory of metaphor and metonymy the combination of linguistic items (based on contiguity and metonymy) represents, next to selection (based on similarity and metaphor), one of the main conceptual operations at work in the production of a message sign. In the gesture modality, combinations of linguistic items may be illustrated by gestural movements that link and contextualize single items (icons, e.g. iconic gestural representations of grammatical categories) that are contiguous (or adjacent) in a certain way: words occurring one after another in a clause or sentence (syntagm) or categories brought into relation in a diagram. As these aspects of contiguity/indexicality are especially relevant for this study and occur in different variants in the data, I will discuss them at greater length than most of the other categories.

Although the gestural movement representing "a string of words" discussed above (ex. 8, video 6) gives an admittedly one-dimensional rendition of words occurring one after the other, it is a way of suggesting the notion of a contiguous speech chain. The triangle-shaped arm configuration we have seen before can also be said to belong to this category, because it provides, in a more differentiated way, a structure that renders the spatial / hierarchical relations holding between single linguistic units. Hence, these hand/arm configurations and movements depict syntactic relations in gesture space with a clear ordering. This is exemplified by the tree chunk illustrated in the first image below (see figure 18, the transcript was provided above (ex. 7)) and also by an alternative gesture that implies a branching movement (VP "invite Terry") of which the end points ("invite" "Terry") are represented by the entire hands in the second image below (figure19). Here it is important to

see that there is a contiguity relation between the two hands (representing together a VP) and that the previously traced triangle can be assumed to be still active in the viewer's mind, thus providing the hierarchical structure that underlies the spelled-out phrase as well as conceptual coherence of a particular kind, that is, informed by a particular theory.

VIDEO #5



Figure 18: Tree chunk (triangle)

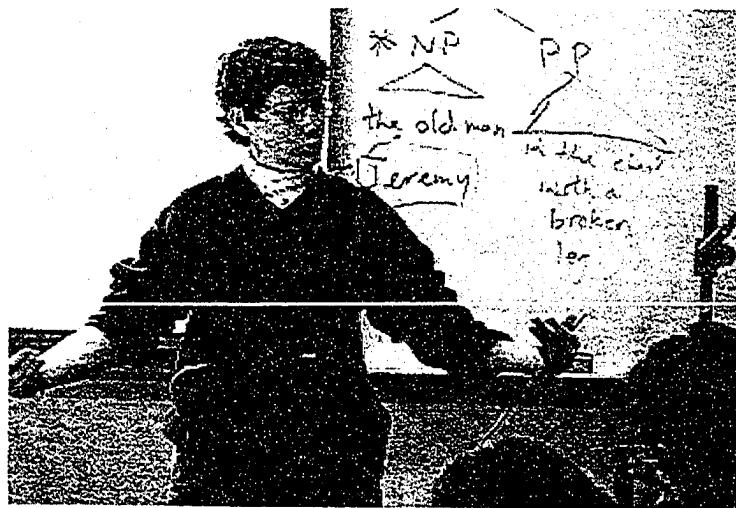


Figure 19: Branching out (triangle)

Due to the branching structure, the elements are further apart from each other in the diagram than they would be in a linear representation of a phrase. As these cases indicate, there are different forms and degrees of organization. The next example is shows a contexture or tissue that is gradually built up by several different gestures which together convey the idea that in languages items are combined and recombined into units of larger and larger complexity. The speaker starts out with small range of gestures in the center space in front of him/her, first evoking graspable elements ("the same few items") and then demonstrating the process character of recombining items by a dynamic image involving both hands revolving around one another. Subsequently, the hands move increasingly apart and toward the ceiling. The last stage of this extensive gestural image is represented by the gesture shown in the image below; it is probably referring to a larger discourse space which we can imagine extending between the two hands as well as vertically (like a big surface/sheet). The wide range and high location of the gesture conveys

the ideas of the adjectives it coincides with: "larger and larger, more and more complex."



(14) ((language made up of items recombined))

G1 bh cups moving inward
 [... Language is built up of the *same fe=w* items, _]

G2 bh lateral rotation
 [(..) recombined]

G3 bh hands move up and out from body
 [(..) and recombined (..) and recombined \]

G4 bh palms facing each other, moving even further outward
 [with larger and larger, /
 and more and more] complex structures. \

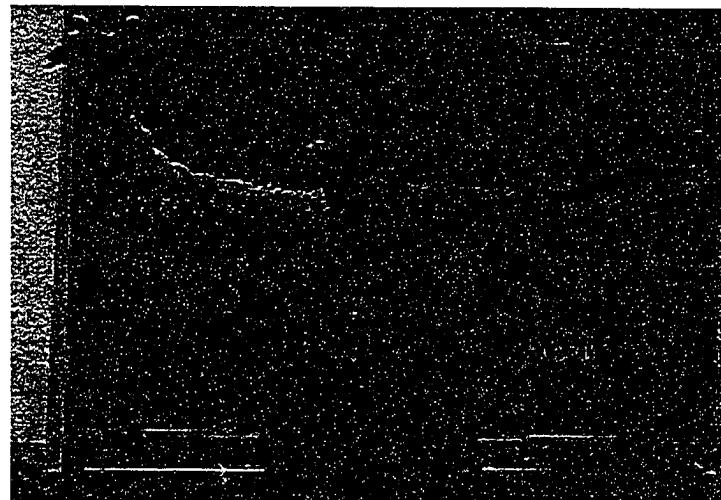


Figure 20: Language items recombined

The next examples pertain to the fact that within such an ensemble (e.g., a word, a phrase, a sentence (a syntagma)), the specific location of an item

(icon) and its relation to other items can give rise to its function, in both linear and hierarchical representations of sentence structure. In the video sequence about word order and phrasal verb constructions, we already saw that the specific location of a linguistic element can be pointed out in gesture space, namely in relation to another gesture. To discuss in more detail how indexicality / contiguity / METONYMY OF PLACE is instantiated in the gesture data, we will now turn to issues of, that is to the representation of different types of, morphemes and their combination into words. There are two strikingly comparable instances in the data where the speakers talk about affixes, and in particular about circumfixes. In example 15 below, the speaker explains the different functions of prefixes, suffixes, infixes, and circumfixes, and uses several types of gestures, some of which are already familiar to us from previous examples.



(15) ((*pre, suf, in, circumfix*))

G1 rh puoh hand displays, holds and retracts toward body

... besides [(uhuh) suffixes at the end, /
and the prefixes at the beginning, /]
 that you can find readily in Eng / \ lish, \

G2 rh cup

[that some languages have infixes, _]

G3 rh sharp downward scrunch

[morphemes that go right into the middle]

G4 bh horizontal part

[of another morpheme, \]

G5 bh move up and out from body center in a semi-circular curve

(..) (um) and some (uh) other [languages have circumfixes, \]

G6 bh like wobbling scales
 the circumfi- fix[is essentially a prefix,
 (...) and a suffix combi=ned, \]

G7 bh palm-up fists at body center, move in and out very quickly
 [(..) but they have to go together, \]

G8 bh hands draw a semi-circle
 [and they surround the word. \]

After setting up the stage by mentioning prefixes and suffixes, the speaker explains the position infixes take in the structure of a word. In figure 16, the speaker is just about to insert an infix into the middle of another morpheme. The idea of insertion is depicted by a well-defined trajectory of the hand tracing a vertical line (executed on the mention of "morphemes that go right into the middle") until it seems to hit "another morpheme," to be imagined as a container which he subsequently sketches by drawing its base line and by alluding to its two outer sides (please see video for a full appreciation of this complex action).



Figure 21: The Infix goes right into the middle of another morpheme

Circumfixes are comparatively complex, since they assume the function of both a prefix and a suffix. In order to illustrate the way both affixes hang together, the speaker makes a gesture that starts off with both hands held next to one another at head level, then takes both hands down to the sides in an arch-like fashion, and ends in the lateral cup gesture shown in the image below (figure 17). Here, each hand seems to be holding one of the affixes that together make up the circumfix. Thereby, the image of a scale is evoked, as the speaker moves the two hands alternatively up and down.



Figure 22: Circumfix: prefix and suffix combined (surround the word)

It is noteworthy that this gesture is used elsewhere to express the idea that two things or ideas are different from one another. The notion of difference (conceptual distance) is expressed through physical distance, reinforced by using the two sides of the body.

The following sequence provides a further example of the understanding that the two elements that build a circumfix together, and surround the word stem, seem to be attached at a level above the word level itself. In the following video sequence, the speaker makes a similar arch-like gesture (on the mention of "it just sort of") when trying to find a way to illustrate the hidden organization (or strings attached) of complex morphological structure.



(16) ((Circumfix))

... Here in *blue*=, /
 (...) another class of affixes, —
 which is called, /
 the *circumfix*, \
 (...) this is, /
 (...) sort of a, /
schizophrenic kind of— /
 kind of affix, \
 it's sort of both a prefix and a suffix at the same time, —

G1 bh hands repeatedly draw a semicircle out and down from speaker's head,
 then hold and beat

[(...) it just sort of ("phih" – vocal noise), /
circums the--, /
(..) circus-, /
(...) encompasses, /
them, /
the front and back end of the word... /]

The image below (figure 23) shows the initial stage of the arch gesture, and is very similar to the way in which the previous speaker represented the same phenomena. This gesture here can also be interpreted as tracing a semi-circle, which would go well with the attempt on the part of the speaker to use a

nonce-verb ("circums") which does not exist but has the potential to describe the idea behind the function of a circumfix and obviously is a back-formation from circumfix and based on the morpheme "circum".

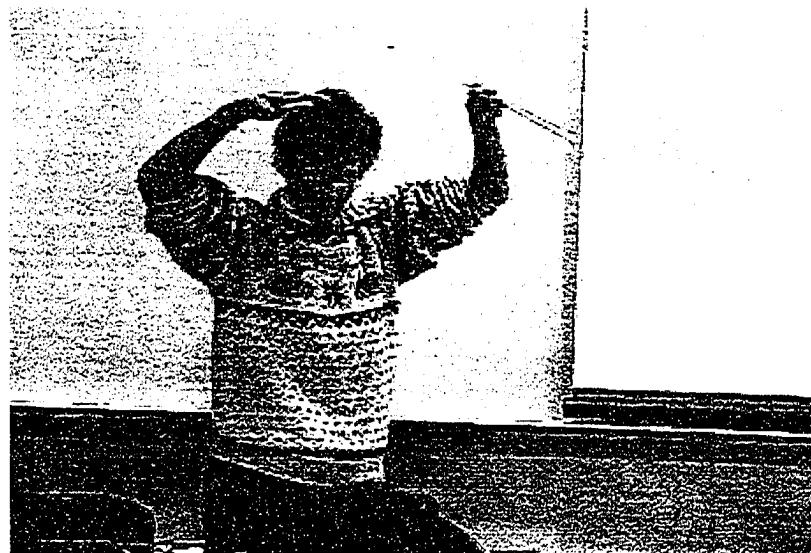


Figure 23: Circumfix as arch gesture

The idea that the "circumfix encompasses the front and back of the word" is illustrated in the second image below (figure 24), which represents the final stage of the gestural demonstration. Here, the two hands seem to be holding the entire morphological structure by its front and back, where the indications "front" and "back" do not refer to spaces closer to or further away from the speaker's body; rather, the front is to the left of the speaker and the back to her right side, in accordance with the conceptualization of a word as extending from left to right in front of the speaker/reader/writer.

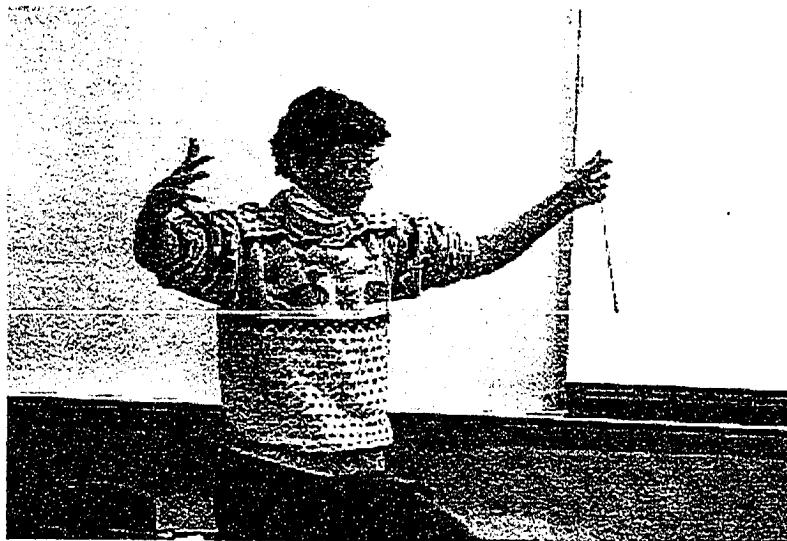


Figure 24: Circumfix encompasses the front and back of the word

When comparing this gesture with the other gestural representation of a circumfix provided above, i.e., the balance gesture (figure 22), it seems that in that case the emphasis was put on the fact that the circumfix consists of two single elements, with each of them being held in one hand, but still being part of one item.

In light of the gestures discussed above, it becomes evident that the ways in which gestural signs are combined, and the relation holding between adjacent signs, contributes significantly to the interpretation of a single gesture and also to how gesture sequences develop their overall meaning. As we have seen, the two hands held next to one another can simply express the order of words (phrasal verbs/particles/pronouns) or a hierarchical structure that is assumed to lie underneath them (words at the bottom of a tree diagram (terminal elements)). Or again, two hands held with some distance between them can illustrate the fact that two grammatical elements can only fulfill their

function when occurring together, even if they don't follow each other immediately, as in the case of a circumfix where the two parts are holding a third form (i.e., a word stem) between them. The point here is that while each hand taken by itself seems to metaphorically represent an abstract object (such as an affix) and can thus be said to be an (metaphoric) icon, there is at the same time a contiguity relation holding between the two hands. In this case, the contiguity relation is structural (morphological). Put differently, one hand points to the other hand, and the concept of the circumfix, and how it fulfills its functions, can only be grasped when seeing the two signs (icons) in conjunction. Given these contiguity relations, I suggest that these gestures are instances of [structural EXTERNAL METONYMY (Jakobson)]. As mentioned before, Jakobson distinguishes between external metonymy (adjacency / contact) between two forms and internal metonymy. In the case of the latter, parts are extracted from a whole to stand for the whole (synecdoche, as discussed in relation with gestural sign constitution).

4.3.3 Indirect reference

In the remaining part of this chapter, my aim is to demonstrate that a major part of the gestures discussed so far can be reread with respect to mechanisms of indirect reference and that metonymic modes (based on contiguity) play an important role not only with regard to structural relations between gestural signs (contiguity / contexture / combination), but also in the successful identification of what a single gestural sign (icon/metaphor) actually refers to.

D) *Reference points, indirect reference.* Here the goal is to show that, in order to interpret a gestural sign, it is often necessary to make a cognitive leap to what the material sign actually points to. In the case of indexical gestures, it is clear that the hand is not the object referred to, but rather that the hand points to that object. Below I will discuss cases in which representational gestures seem to work in a similar way, except that the object referred to is not situated in the physical/abstract surroundings, but is contiguous to the manual articulators.

[referential EXTERNAL METONYMY (Jakobson)]

With regard to the prototypical OBJECT gesture, it has already been noted that the hands do not necessarily represent the object in its entirety; rather, the imaginary (abstract) object is evoked via the manual action of seemingly holding a physical object between two hands.

Let us look at another instance of this type of gesture. In the sequence below (ex. 17), the speaker asks the students what they think the sequence "I don't know" represents. After a short moment of hesitation and the occurrence of the teacher's gesture anticipating, at least conceptually, the answer, teacher and students agree that it is an instance of a "prefab[ricated] chunk" (the gesture preceding the object gesture is another example of an index pointing to words written on the board, that is, to those words that the question the teacher poses is about).



(17) ((chunk (*I don't know*)))

... don't know appears, —
 now (..) when you look at I don't kno=w, —
 what do you, /
 what do you think that's— /

G1 bh container
 [...]it's a (..) probably a prefab (..) chunk, /
right? /]



Figure 25: A pre-fab chunk ('I don't know')

The important point here is that the hands (figure 25) do not directly represent the chunk; they point to the factually invisible chunk that has to be imagined by the viewer. Put differently, the manual articulators provide mental access to the object that is seemingly being held between them. The very object in

turn stands, metaphorically, for the prefab chunk "I don't know." There are two more aspects of this gesture that deserve attention. First, the gesture is being held over an extended period of time, namely until the answer to the question is found and the teacher asks the students for approving feedback ("a prefab chunk, right?"). Second, as opposed to the circumfix example which functions according to the same principles of indirect reference but draws attention to the inner structure of a word, the notion of a chunk entails the idea of a unit that, although it does consist of several words, is used as a prefabricated and unanalyzed building block in which the divisions between the different parts are not of interest.

One of the gestures briefly looked at above exemplifies the principle of indirect reference. It is an open hand gesture with fingers formed like a cup and refers to "the main verb" (ex. 12, video 12, provided again in the image below (fig. 21). Again, the main verb needs to be imagined as sitting inside of the cupped hand, and again it is via a metaphorical interpretation that the imagined (small) object stands for the abstract concept the speaker is talking about. We can also say that the imitated action of holding an object may stand for the object involved in the action. Or, one can stress the idea that the object in the hand is presented to the audience, and thus that the act of presentation may stand for the presented item.

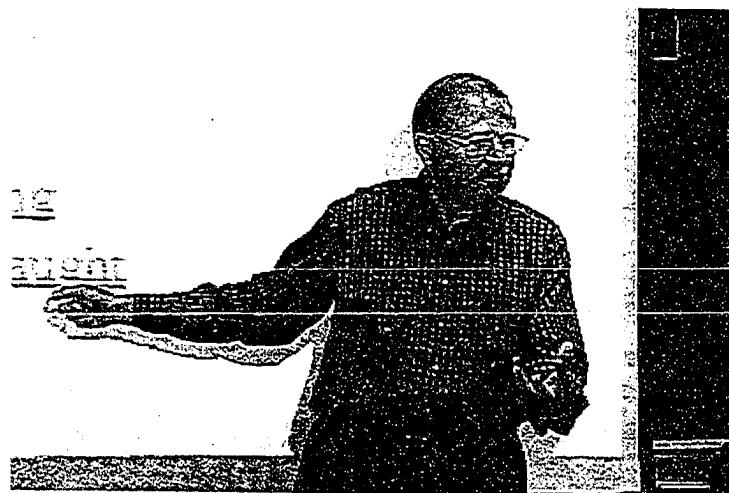


Figure 26: Indirect reference / action for object involved

What all these examples of indirect reference have in common is that they represent single items and can thus be said to be icons whose interpretation also depends on the indexical modes just pointed out: in each of these sign processes, the hands point to a contiguous object that is conceived of as being in direct contact with it (adjacency / contiguity / contexture). The eyes of the interpreter may perceive manual articulators in diverse shapes, orientations, and locations, performing diverse movements (one hand by itself, or both hands together, or each hand separately). Yet the mind has the task to fill in the object that is actually referred to in the concurrent speech: for example, the object extending between two vertically held open hands facing each other (circumfix, constituent, chunk, etc.), or the object sitting on the palm-up open hand (main verb, affixes, etc.). The ways in which contemporary views of metonymy account for reference points (Langacker) in language and how

these observations can be transferred into the context of gesture study will be discussed in the final part of the dissertation.

E) *Signs in relation to body parts:* Gestures that derive some semantic features from the body part in relation to which they are produced (e.g., Bouvet's example of glasses placed on nose. [referential EXTERNAL METONYMY (Jakobson) / METONYMY OF PLACE]

Here I will illustrate two different types of gestures that are produced in relation to the speaker's body: those that directly derive some of their meaning from the proximity of a certain body part, for example the head, and those that strikingly leave the default gesture space segment in front of the upper body and derive some of their meaning as a result of their location.

The excerpt below (ex. 18) contains an example of the first type: the speaker talks about a certain understanding of the nature of grammar, and makes, on the mention of "knowledge," a gesture consisting of each of her hands touching/grasping one side of her forehead (figure 27).



(18) ((*emergent grammar*))

... The idea that, /
 G1, bh hands at head (container)
 [it's not that you lea=rn a lot of knowledge,]

G2 hands extended towards audience
 (...) and then you learn how to apply it]

G3 rh horizontal wrist rotations (scrunch)
 [but rather, _
 with the doing, _
 with the activation, /]
 (..) grammar emerges, \

G4 rh hand displays (cup)
 [grammar emerges from, /
 (..) language use, /]

G5 rh fist
 [not]

G6 rh fist moves up, then lh fist displayed at same
 vertical level
 [from *knowledge*
 becoming *automatized*. \]

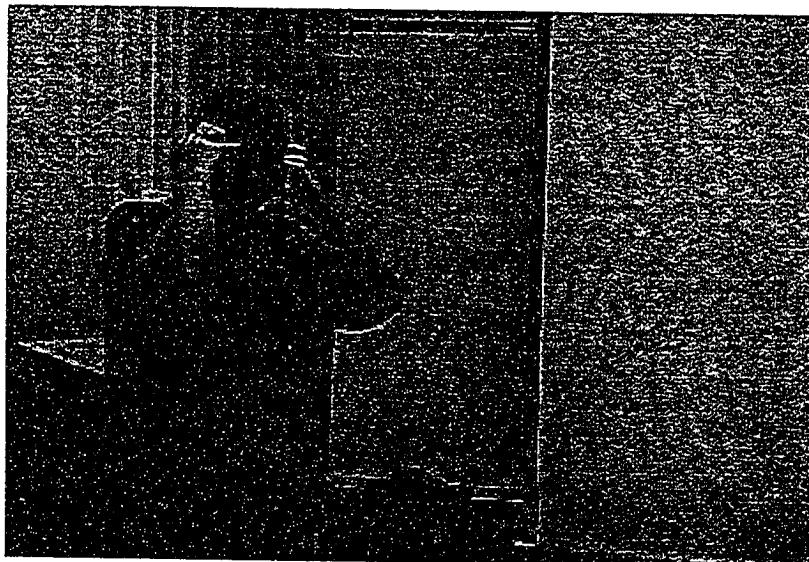


Figure 27: 'Knowledge' (metonymy of place)

This hand configuration resembles in a way a container gesture, except that it is attached at the head, pointing to the mind inside of the head. Because of the metaphorical understanding of the head as a container, similar gestures referring to the mind have been counted as metaphorical gestures (Webb

1996). However, I would suggest that it can also be read as an instance of metonymy, in which the outside of the head stands for the inside (mind, knowledge). The immediately following gesture (figure 28) evokes the idea of externalizing what is inside of the head by applying the knowledge, in this case when applying grammatical knowledge when using language. Concurrent with "and then you learn how to apply it," both hands leave the forehead in an abrupt movement, and forearms and hands are extended away from the body, with slightly tilted palm-up open hands. Applied knowledge, this gesture seems to suggest, is perceivable knowledge out in the open; it is thus probably something concrete that one can hold in one's hands and show to someone. Or, it could also be externalized as words that can be heard.

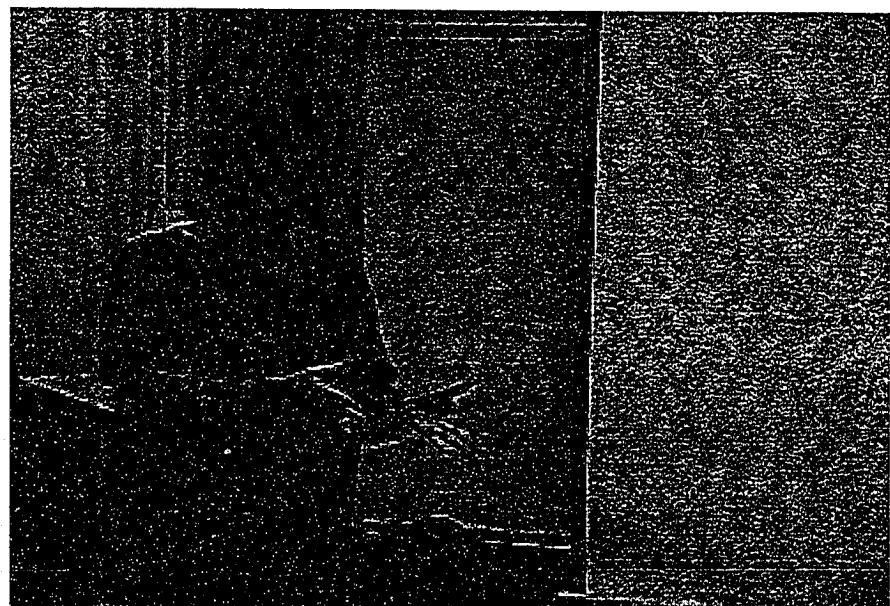


Figure 28: Application of knowledge (externalization)

The last example takes us back to a video sequence we have looked at earlier (ex. 12, video 10), but this time we are interested in the last gesture, which represents the idea of a “sub-category” as an object between (relatively relaxed) hands that are held well below the space where the speaker tends to explain grammatical categories and sentence structure. The relation to the body is not as direct as in the first example above, but the linguist’s body and the space in front of it (chest, stomach) where most of the gestures are produced still seem to function as a reference point. The meaning of the term “sub-category” is illustratively represented by a gesture that is produced in a relatively low position (relative to the body). If one were to accompany the same word (sub-category) with the same object/container gesture produced in front of the chest, the effect of the gesture would not be as insightful, or would be different in meaning (also seen in relation to other gestures). Being in a socially conditioned space, the gesturer is thus in the position to establish different kinds relations.

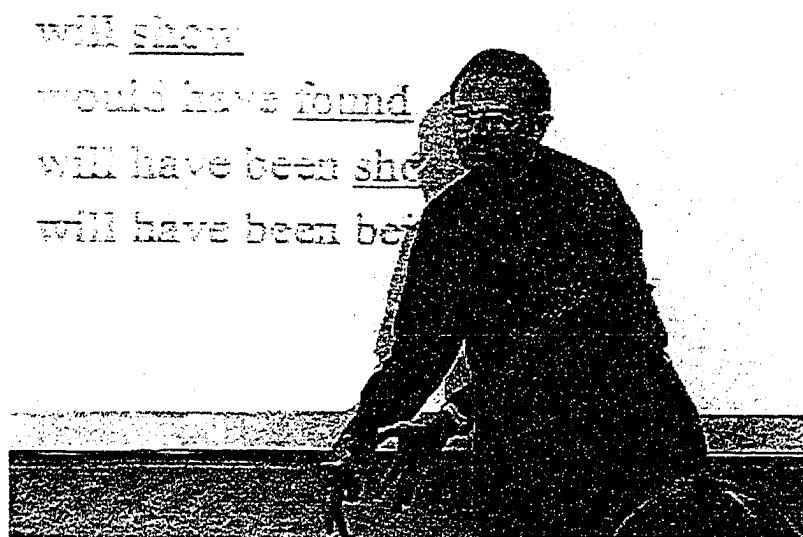


Figure 29: Subcategory, comparatively low (metonymy of place)

While the metaphorical understanding of subordination entails that a subcategory is placed underneath the category it depends on, I would suggest that METONYMY OF PLACE (place in respect to the body) also plays a role in the interpretation of the gesture illustrated above and also of similar cases which cannot be discussed here.

3.4. Summary

What has become clear in view of the different indexical modes discussed above is that there seems to be an important difference between semiotic principles that motivate sign formation (always partial, synecdochic, internal metonymy), those principles that establish referential mechanisms (icons of various sorts (similarity), concrete and abstract deixis (contiguity), and indirect reference (metonymy)), and finally those that are structuring devices, highlighting how signs are combined and related (diagrams, external metonymy (contiguity/adjacency)).

These observations seem to confirm what was suggested earlier in the chapter on Jakobson and more precisely in the section where I discussed the metonymic structural devices in Cubist paintings and academic prose. In other words, while the sign-object relationship of the entire message sign might be metaphorical in a multimodal discourse on abstract subject matters (total metaphor, based on similarity), the ways in which the discourse is structured and the treatment of the subject matter progresses may still be predominantly metonymic (based on contiguity). We also saw cases in which

referential mechanisms involve not only internal metonymy (objects are only represented via their essential properties), but also external metonymy (indirect reference, action for object involved in action, etc.). In light of all the different indexical modes identified in the meta-grammatical gesture data, we can now say that metaphor and metonymy interact in various ways in these complex meaning-making and organizing processes, showing different hierarchical relations between the two modes. These issues will be further illustrated in the following and final chapter of the dissertation.

CHAPTER FIVE

IMAGES OF GRAMMAR: EMERGENT FIGURATIONS, THEORETICAL CONSTRUCTS, AND SIGNPOSTS

In this chapter, I will discuss the salient gestural forms and motions observed in the data. The aim is to provide a systematic account of the prominent representations hands and arms engage in when illustrating explanations of linguistic form and grammatical relations. Starting from the concrete manual configurations and movements offers the advantage that hand shapes recurring across speakers and subject matters can be identified and compared in terms of their cognitive, semantic, and pragmatic functions. In this way, the links between the concrete and the abstract, and hence between iconicity and metaphoricity, will thus be made going from concrete forms (gesture) to abstract domains (grammatical phenomena). Taking into account the concurrent speech content, this allows us to discern recurrent form-meaning-function pairings as well as to arrive at some of the underlying metaphorical and metonymical processes.

5.1 Emergent figures: Salient hand shapes and motion patterns

Before looking at particular gestures, I will briefly give an idea of the representational tendencies that have emerged from the data. The best-supported observation is that morphemes, words, phrases, and grammatical categories tend to be represented as imaginary physical objects held and

manipulated in various ways. Such objects can be either solid, or have explicit interiors in which other items can be placed, thus evoking a container. In addition to object and container image schemas, which surface strikingly in the gesture data, indexical gestures pointing to a location in the space in front of the speaker as well as placing gestures are also heavily used to illustrate grammatical units and their relation to each other. This provides, in my view, a window into how the “what” and the “where” (Landau & Jackendoff 1993) in gesture space can be set up in different ways, each time highlighting specific aspects of the items or events referred to, be it the position of a unit in a structure, its function, or a change of a previous arrangement (due to a syntactic operation performed on it). Put differently, certain features can become dominant in a given speech-gesture utterance: in some instances, the morphological aspect of a gestural sign is foregrounded, i.e. most of the significant information lies in the configuration of the hands; in other instances, the motion hands carry the relevant semantic features; and in yet another instances, location is crucial. In Peircean terms, each time specific qualities of the gesture establish the ground of the sign process while others remain more or less irrelevant. With these aspects of sign constitution and reference in mind, the discussion of the ways in which gestures represent linguistic units and structures is organized in the present section by gestural patterns or, in other words, by the features that appear to carry the most semiotic and communicative weight in a communicative event. Although it is not always easy to separate features of a global gesture and although a certain hand shape tends to have an inbuilt pragmatic function – such as presenting an object to the audience on a palm-up open-hand – this first part of the

analysis was designed to identify those features that seem to be salient in a given utterance.

As has been noted in previous chapters, a set of image-schematic patterns emerges in the data and seems to play into the iconic, metaphoric, and metonymic meaning construction in the ongoing discourse. The image schemata are not just derived from the forms; rather, hand shapes and movements feed into the evocation of the full schemata. Some of the most salient patterns indeed seem to correspond to the image schemata proposed in the cognitive linguistics literature, notably by Johnson (1987; see also chapter III above): object, support, containment, balance, source-path-goal, scale, part-whole, geometric shapes such as triangles, circles, and squares, as well as lines traced along horizontal, vertical, and diagonal axes. Such image schemata are supposed to build the structural basis for metaphorical projection. It has already been pointed out that the object schema (and the conceptual metaphor IDEAS ARE OBJECTS) figures prominently in the data. Moreover, the concept of containment is important, since linguistic units can be contained in larger units (CATEGORIES ARE CONTAINERS, CONSTITUENTS ARE CONTENTS; Grady 1998; Johnson 1987; Reddy 1979). A sentence can be conceptualized in terms of either a container, a path with a source and goal, a tree diagram, or more generally as a physical structure (CONCEPTUAL STRUCTURE IS PHYSICAL STRUCTURE; Sweetser 1998). As has been discussed in detail in chapters 3 and 4, metonymy (here synecdochic part-whole relations) also seems to be at work in these manifestations of metaphorical projection: first, image schemata evoke the complex gestalts they stand for. Second, typical schemata have parts (people, events, states, sources, goals) and internal relations (causal, temporal, agent-patient, part-whole, etc., cf. Johnson 1987:

28), e.g. a coherent unified whole can be broken down into parts. Below we will see how some of these image schemata, and additional ones, are instantiated in the data not only with regard to one speaker but also across speakers. Of particular interest here are the ways in which they may build the basis of metaphorical and metonymical projection that in turn motivate gestural representations of grammatical phenomena.

5.1.1 Salient hand shapes and configurations

The meaning of a given gesture may evidently rely on the semiotic collaboration of several parameters, of which the shape of the hand is only one. Depending on the speech content and the flow of information, the hand shape can be said to be salient in a gesture if it is the most notable feature and contributes the key semantic features to the bi-modally achieved message of an utterance.

Across all four subjects, the data show recurrent representations of morphemes and other small linguistic units as easily maneuverable objects. As will be illustrated in this section, there are many different ways of holding and manipulating imaginary items. One possible way to refer to an abstract item is to seemingly hold a linguistic unit placed on a palm up open hand. The degree to which the hand is flat, relaxed, or cupped varies greatly, but this basic hand shape and the action of holding, presenting, or offering an imaginary object for inspection has been observed in many contexts (Müller 2004). As a matter of fact, the palm-up open hand gesture, one of several types of "palm presentation" gestures (cf. Kendon 2004: 264ff.), was frequently observed in the teaching contexts under investigation here, especially when teachers

talked about abstract concepts and categories that were not visibly present in the immediate environment (see also the gesture J.F. Kennedy makes in the photograph provided in the introduction).

The following list represents the different open-hand variants found in the data. Each type was assigned an abbreviation referring to the openness and orientation of the palm (such as "puoh") plus a "name" and an indication of which hand was used (some of the palm-up open hand abbreviations follow Müller (2004):⁴⁵

Single hand / open hand variants:

puoh: palm-up open hand; rh: right hand; lh: left hand; bh: both hands	
M. puoh-tray-lh/rh/bh	hand as flat surface, supporting imaginary objects
N. puoh-cup-lh/rh/bh	hand with curled fingers, forming a receptacle
O. pfoh-stop-lh/rh/bh	[“f” stands for “front,” meaning palm faces audience]
P. pdoh-lid-lh/rh/bh	[“d” stands for “down,” flat hand]
Q. pdoh-claw-lh/rh/bh	[open hand facing down, fingers curled]
R. pcoh-blade-lh/rh/bh	[“c” stands for palm facing center of gesture space]

Some of the other gesture types include: "measure," "fist," "index" (pointing with the index finger extended ["ind-index"]) or with the entire hand ["hand-index"]), and "pinch."

⁴⁵ I wish to thank Allegra Giovine and Daniel Sternberg for their invaluable collaboration on this part of the analysis.

Additional hand shapes / pointing

S.	i-t-measure-lh/rh/bh	[“I” for index, “t” for thumb]
T.	fist-lh/rh/bh	
U.	ind-index-lh/rh/bh	[pointing with generic extended index finger]
V.	hand-index-lh/rh/bh	[pointing with full, relaxed hand]
W.	pinch-lh/rh/bh	[fingertips of index and thumb pressed together]
X.	scrunch-lh/rh/bh	[like a pinch, but with different orientation and finger configuration, fingers together and facing audience, tips pointing towards floor.]

In addition to those gestures that can be performed with either one hand or both hands (with a tendency for single-handedness), other gestures could be observed in the data that are always performed with two hands, evoking an internal structure, or what one might also call “syntax” (cf. Kendon (2004: 275ff.) on Open Hand Supine gestures with lateral movement). Examples are the box/ object gesture mentioned above in which the imaginary object is held between two hands or the gesture that conveys the image of a balance weighing two things, with two open hands each of which is seemingly holding a small object and moving alternately up and down (as seen in one of the circumfix illustrations discussed in chapter 4).

both hands / open hand variants

Y.	puoh-tray-lateral	[balance]
Z.	puoh-cup-lateral	[balance]
AA.	puoh-sym-offshoot	[hands extend laterally from center outward]
BB.	pcoh-box-bh	[refers to an elongated object / container held by both hands]

The data were searched for instantiations of each of these identified shapes (and movement patterns, to be discussed below) across topics and speakers. For most of these forms, three instances were documented with regard to the concurrent speech content and with regard to the overall meaning of such multimodal representations. The respective information (gesture type, using the abbreviations provided in the list above, clip name, the gesture phrases that coincide with the gesture, and a short commentary pertaining to the meaning of each instance) was gathered and is represented in list form (please see appendix). Here, I will only be able to discuss and illustrate a selected set of these hand shapes (some of which figured already in the previous chapters).

PUOH (palm-up open-hand) variants: trays and cups

Small linguistic units, such as morphemes, words, and categories were found to be seemingly held either on some kind of variant of a palm-up open hand gesture or inside a closed fist. The example below shows both palm up open hands and closed fists ('the teacher'). Gestures of these kinds could not be observed with regard to sentences, which are comparatively larger constructs. The gesture shown in figure 31 is a prototypical instance of a palm-up open hand gesture with an almost flat palm evoking a kind of tray on which items can be placed (i.e., imagined) and 'shown/presented' to the audience (in this case, the speaker refers to a noun when producing this gesture). From just looking at the hand shape it might not be clear whether the action the hand is performing is an action of offering, receiving, showing, and so forth. In conjunction with the speech content, however, it becomes evident that the gesture shown in figure 30, for instance, represents the action of receiving. It

denotes the semantic role “recipient,” by showing an open hand ready to receive an object.



Figure 30: puoh-cup stands for recipient

Video # 22



Figure 31: puoh-tray stands for a noun

Video # 26

By iconically handling small imaginary objects, linguistic units are thus reified and made graspable for the mind. These observations support Müller’s (2004) detailed account of forms and uses of the palm up open hand gesture (cf. also Kendon 2004).

Fists

As the next examples suggest, small objects can also appear in closed hands. In figure 32, the speaker refers to grammatical “knowledge” when forming the first fist (left hand) and to the idea that “knowledge becomes automatized” with usage when forming the second fist. This static rendition of the notion “knowledge” is in contrast to the idea of usage which she represents by rotating both hands around one another. The speaker in figure 33 is talking about morphemes (the teacher-er) when making a fist for each of them.



Figure 32: Fist(s) for knowledge
(grasp/mastery)

Video # 16



Figure 33: Fists containing
morphemes (teach-er)

Video # 7

The fist seems to have, compared to the open hand variants, a different semantic import; it evokes the idea of having captured a concept, or of having a firm grasp of it: one knows how to handle a certain phenomenon, as opposed to offering an idea on an open hand for inspection and commentary, or alluding to the fact that one does not have an answer and is thus "empty-handed."

Pinch/Measurement (thumb and index with different amounts of space between them)

We will now look at some hand shapes in which the configuration of index finger and thumb play a semantic role. The two examples below represent cases of pinch gestures. A pinch involves the index finger and thumb pressed together, and is generally used to convey the idea of precision or tangibility. The gesture shown in figure 34 expresses the idea of a precise list of categories in the theory of relational grammar. By contrast, the gesture in figure 35

features rounded fingers and resembles an emblematic gesture that occurs across cultures and contexts with slightly different coded meanings, ranging from precision to perfection. Here, it has a well-defined signification: it refers to the technical term "node" (in a syntactic tree diagram) and imitates in a way the form of a node.

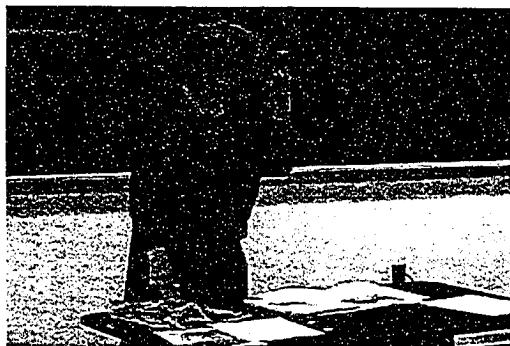


Figure 34: Pinch indicating precise list of categories

Video # 21



Figure 35: Pinch/ring indicating 'node' (tree)

Video #29

An alternative way to manipulate small objects is to hold them between the tips of the thumb and index finger, as if one was taking a measure (an L hand according to ASL hand shapes, cf. Webb 1996). For example, the gesture in figure 36 stands for a verb form ("fell") at the end of a sentence. In figure 37, the small space between index finger and thumb indicates the compact nature of the pronoun "it" (or other pro-forms), alluding to the placement and function of such minimal forms (in this case, in phrasal verb constructions).

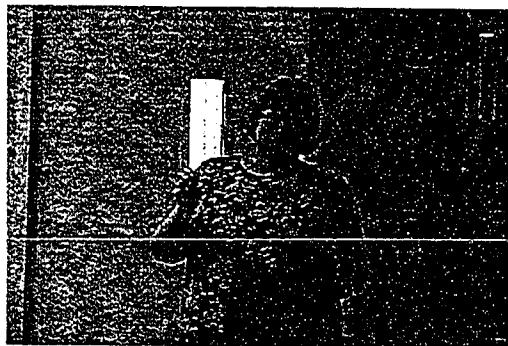


Figure 36: Measure representing verb form

Video #27

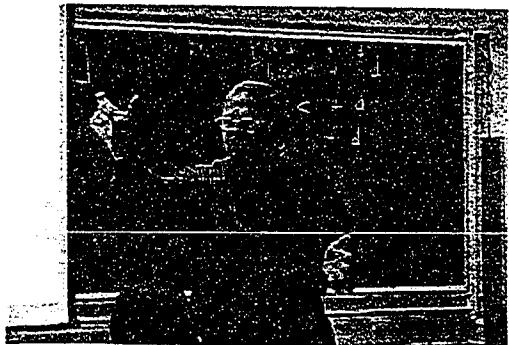


Figure 37: Measure: small space represents 'it'

Video # 11

A gesture heavily used to represent parts of speech, words, phrases, and sentences depicts a comparatively bigger imaginary solid object as being held by two, relatively relaxed, open hands with palms facing each other. The examples below show two of the more expansive versions in which speakers move the hands far apart to represent a sentence (figure 38) or a constituent (figure 39).



Figure 38: pcoh-box representing a sentence

Video #27



Figure 39: pcoh-box representing a constituent

Video #28

Although there is no clear correspondence between the amount of space extending between the articulators, we can observe that small objects (such as single morphemes and words) are not represented by wide object/container (box) gestures and that sentences do not seem to fit on the surface provided by a single palm-up open hand. In general, there is a tendency that linguistic units of different degrees of complexity are represented as being held in one hand, two hands, or between two hands. The hand shapes seem to be motivated, at least in part, by the semiotic affordances of hands, their (object-oriented) actions, and also by the spatial dimensions that can be exploited to visualize, in space and time, conceptual images of abstract entities and structures. The anchor point for these representations is the human body with its specific way of expressing itself and with its own range of movement. Having focused on what one might want to call morphological aspects of gestural configurations, motion patterns will be discussed next.

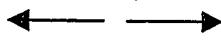
5.1.2 Salient motion patterns

To identify salient motion patterns, one needs to determine, for each holistic gestural gestalt/movement, the features that contribute most significantly to its meaning. Clearly, this can only be done in correlation with the speech content. Below, I will present those movements that appear to be salient with respect to the meaning of a given gesture, i.e., the movement as such is more significant than the particular shape of the hand performing the movement.

The movements observed in the data exhibit at least two different intrinsic logics, which can be distinguished between a movement that is brought to bear when the hand traces a connection between different points in

gesture space (such as a line running from the beginning of an imaginative sentence to its end) and a genuine motor action such as the rotation of the wrist or a sweep performed with hand and forearm. With these considerations in mind, the following typology of salient movement patterns found in the data was established:

Linear movements, along a single axis (horizontal/vertical/diagonal)

- | | | |
|---------------------|--|---|
| A. hori-trace-lh/rh | horizontal |  |
| B. vert-trace-lh/rh | vertical |  |
| C. diag-trace-rh | diagonal line |  |
| D. diag-trace-ll | |  |
| E. diag-trace-lat | triangle
(e.g. tree structures) |  |
| F. hori-join-lat | horizontal line drawn with both hands
going inward
(lateral inward movement) |  |
| G. hori-part-lat | horizontal line drawn with both hands,
(lateral outward movement) |  |
| H. push-lh/rh/bh | push away from body along a straight line,
not curved (exploiting depth) | |
| I. pull-lh/rh/bh | pull toward body along a straight line, not
curved (exploiting depth) | |
| J. scale-lh/rh/bh | hand trace vertically organized steps/levels | |

non-linear trace

- K. hori-wave-lh/rh/bh wavy line traced in the air, along a horizontal axis



- L. diag-wave-lh/rh/bh wavy line traced in the air, along a diagonal axis

curves and circles

- M. up-curve-lf/rh/bh hand(s) move(s) along upper half of circle (semi-rotational)



- N. dn-curve-lf/rh/bh hand(s) move(s) along lower half of circle

- O. circle-lh/rh/lh hand(s) complete one full cycle, rotation



- P. rotation-lateral both hands (and arms) draw circles repeatedly rotating around one another

- Q. wrist-rota-lh/rh/bh wrist rotation, occurs with different orientations

Again, the list in the appendix provides an overview of instantiations of these motion patterns across subjects. Several of the patterns in the list above have been already discussed in previous chapters, for example: horizontal trace (order of elements in a sentence, video #6), vertical trace (list of categories, video #21), lateral diagonal traces evoking triangles (video #5), and lateral horizontal traces outward (string of words, video #6). Here, I will point to a few additional examples, which evoke visuo-dynamic images of cognitive and syntactic operations (to fully appreciate the the dynamic nature of the movements, please view the video clips).

hori-join-lateral horizontal line drawn with both hands, going inward
(lateral inward movement)



Figure 40: "hori-join," blurring boundaries between concepts

Video #1



Figure 41: "hori-join," words go together (travel)

Video #30

hori-wave-lh/rh/bh

a wavy line traced in the air, along a horizontal axis

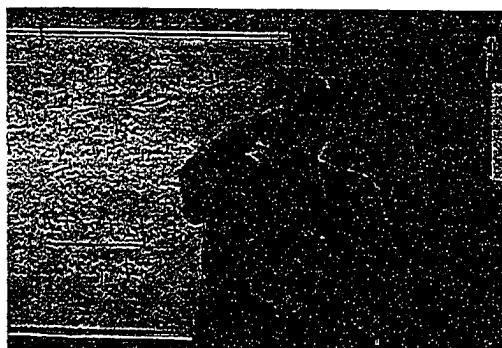


Figure 42: Horizontal wave for 'non-linearity'

Video # 20



Figure 43: Horizontal wave for 'intonation contour'

Video #18

As this spectrum of salient patterns shows, some of the gestural forms and movements allude to geometric figures (lines, circles, triangles, squares, etc.). As shown above, a set of image and motor schematic patterns that emerge from spontaneous representational gestures accompanying meta-grammatical explanations were observed. The specific features of the figurations identified in the data evoke these schemata: the hand shapes and movements give minimal information, thus providing visuo-gestural evidence for some of the image schemata proposed in the cognitive linguistics literature (Johnson 1987; Lakoff 1987): support ("tray," "cup"), containment ("box"), source-path-goal ("hori-trace"), balance ("symmetric offshoot," "tray-bh," "cup-bh"), scale ("scale"), part-whole (synecdoche, metonymy, inner organization of image schemata); geometric shapes (circle, triangle, rectangle); as well as lines (sometimes in form of waves) traced along horizontal, vertical, and diagonal axes (see also list in appendix II and chapter III).

In light of these observations, we can see how the present gesture data bring out the dynamic aspects of cognition and knowledge, reflecting Peirce's understanding of the sign, or semiosis, as a dynamic and infinite process (Peirce 1931/1960). Gestures are not simply visual, but visuo-motoric. They have the capacity to portray abstract processes as visible patterns based on sensory-motor schemas whose linguistic rendition would often take a lot more effort. Contrary to static visual representations of word and sentence structure captured on paper, these gestures thus afford a "representation of abstract processes as dynamic patterns" (Kendon 1997: 112) through a "dynamic visuo-spatial imagery" (McNeill et al. 2001: 11). Through the various motions and trajectories traced in the air, structures and syntactic operations seem to come

to life: branches branch out, words move or travel together to the front of a sentence, and in active-passive transformations subject and object are flip-flopped (as seen in chapters II and III). Instrumental hand actions of manipulating and placing items highlight the process character of constructing a sentence, prefixation, suffixation, etc. In addition, phenomena such as 'reiteration,' 'recursion,' as well as 'function' were found to be represented by the rotation of one or two hands, and a similar motor schema was observed to signify the idea of active language use as opposed to static grammar rules. Also, the action of literally drawing diagrams on paper or on blackboards is likely to determine how hands trace connections between imaginary grammatical constituents via movements through space. The cultural practice of writing and reading from left to right in the Western cultures certainly influences our spatial conceptualizations of words and sentences.

5.2 Metaphorical Projections: From basic units to theoretical constructs

In this section, I will give a condensed overview of the principal metaphorical understandings of representing linguistic forms and structures observed in the data. Throughout the discussion, we will revisit some of the video sequences already seen before. However, this time the approach is thematic (not morphological), that is, the particular grammatical phenomena build the starting point from which to determine how such categories and structures materialize, even if only for a second, in gesture.

The ways in which language and communication are metaphorically structured were among the first topics of great interest to cognitive linguists. The conduit metaphor, introduced by Reddy (1979/1993), encapsulates the understanding of ideas as objects which are placed into containers (words, sentences) for the purpose of communicative exchange, which takes place along a conduit linking the interlocutors. Meta-linguistic expressions such as 'It's difficult to put my ideas into words' or 'his words seem hollow', exemplify the metaphorical projections that Lakoff & Johnson (1980: 10-11) posit as follows: IDEAS/MEANINGS ARE OBJECTS, LINGUISTIC EXPRESSIONS ARE CONTAINERS, COMMUNICATION IS SENDING. Grady (1998: 210f.) argued that the conduit metaphor needed to be reexamined at a broader level of generality, and proposed a set of more basic metaphors directly motivated by experience. Especially relevant for this study is Grady's point that "there is a conceptualization of the constituents of sentences (either on a formal or a propositional level) as though they were contained within those sentences" (ibid. 211). The CONSTITUENTS ARE CONTENTS metaphor does not always entail actual physical containment made salient by boundaries and containers. It further takes a "leap" (ibid. 212) from physical constituents and physical structure to abstract constituents and abstract structure to arrive at the metaphorical understanding that "large linguistic structures contain the smaller structures of which they are composed" (ibid. 217). As we will see, this understanding is among the core elements of grammatical theory that are brought to light in the gesture modality.

Sweetser (1987) examines the metaphorical models of thought and speech and proposes that the IDEAS ARE OBJECTS metaphor can be regarded

as a sort of 'meta-metaphor' underlying many metaphorical schemas reflected by speech act verbs and mental state verbs. Speech-exchange can be seen as the exchange of objects (ideas) packaged in linguistic form and reasoning as object manipulation or the construction of a logical object (i.e. a theory).

Considering that linguistic form is tied to grammatical functions and that the construction of a sentence ('a logical object', in Sweetser's terms) involves the manipulation and combination of grammatical categories (building blocks) into phrases, it is evident that grammatical thought is comparable to reasoning and theorizing (distinction, categorization, induction, deduction, hypothesizing, etc. [ibid.]).

Sweetser (1998) convincingly shows that the metaphorical understandings of speech and thought she identified as emerging in language (1987, 1992) have remarkable correspondences in the gesture modality. These are, in addition to the conduit metaphor (for further evidence of the conduit metaphor in gesture and ASL cf. McNeill 1992; Taub 2001; Wilcox 2000):

THOUGHT IS MOTION THROUGH SPACE

CONCEPTUAL STRUCTURE IS SPATIAL GEOMETRIC STRUCTURE

CONCEPTUAL RELATIONSHIP IS PHYSICAL RELATION

IDEAS ARE LOCATIONS IN SPACE

(Sweetser 1998)

These findings are not only relevant for grammatical thought and its gestural expression; they also make us realize that all the mental activities that Sweetser describes (comprehending, seizing, capturing, distinguishing) are

things we do first of all with our hands (touching, grasping, catching, separating). The following metaphorical concepts express exactly this mind-body connection (Lakoff & Johnson 1980):

UNDERSTANDING IS SEEING

UNDERSTANDING IS GRASPING

(Lakoff and Johnson 1980)

Gestures can help us *see* and *comprehend* what is being talked about, even if the subject matter is currently or genuinely invisible.⁴⁶

As has become evident, the data show that gestures representing abstracta have the propensity to reveal metaphorical understandings, that is, to portray a linguistic category or part of speech as an imaginary object or container, even if the concurrent speech is not per se metaphoric, but rather features technical terms such as noun, verb, sentence, etc. Syntactic categories as well as operations ('subject-verb agreement' or 'topicalization') get translated into the concrete manual modality by evoking some sort of parallelism between the intangible and the embodied, offering the audience visible spatial information, even if it is only in the form of an imaginary object or line. The discussion will progress from basic items to units of greater complexity, and finally to theoretically more complex views of sentence structure.

⁴⁶ For work on gestural images of other abstract subject matters cf. Cienki 1998 (moral concepts); McNeill 1992: 147ff. (conduits), 164ff. (mathematics); Núñez, (mathematics), Sweetser 1998 (philosophy); Webb 1996 (philosophy). See also Calbris 2003 and Müller 2004b.

5.2.1 Gestural representations of linguistic units (morphemes, words, phrases, categories)

When linguistically referring to linguistic units, one generally has two options: either using the technical term of a grammatical category such as 'noun', 'verb', 'object', 'stem', or 'ending', or the actual words, lexemes, or inflections that fill the grammatical categories, such as the noun phrase 'the teacher.' Both strategies are alternately employed in the data.

Morphemes, words, phrases, and grammatical categories are predominantly represented as imaginary physical objects held and manipulated in various ways. Across all four subjects, the data show recurrent representations of morphemes and words as small objects seemingly held by the tips of thumb and index finger of either only the dominant hand or both hands, as if the speaker was taking measure (an L hand according to ASL hand shapes, cf. Webb 1996). Another possibility is to hold a linguistic unit in one's hand, either placed on a palm up open hand (see Figure 1 below), or inside of a closed fist (as in the example "the teacher;" Video #7).



Figure 44: A linguistic unit as an object on a palm up open hand

(videos #7, #13, #26)

As has been noted throughout the previous chapters, object and container image schemas surface, in numerous variations, strikingly in the gesture data, and appear to form the basis for the metaphorical interpretation of meta-grammatical gestures. These representations can be interpreted as reflecting the following metaphorical concepts:

GRAMMATICAL CATEGORIES ARE OBJECTS / CONTAINERS

MORPHEMES / WORDS / PHRASES ARE OBJECTS / CONTAINERS

LINGUISTIC UNITS / CATEGORIES ARE LOCATIONS IN SPACE

Whether a solid object or a container is evoked in a given moment, or whether the location or a specific property of an entity is highlighted, appears to be motivated by discourse-pragmatic principles of information flow and communicative goals. It may depend on whether the same element was previously introduced and how well the students in the audience has already mastered a particular concept. By contrast, a container with an explicit inside is evoked, for instance, when a speaker refers to infixes that go in the middle of a morpheme (video #13, "pre, suf, in, circumfix"). It is also interesting that containers, as opposed to solid objects, are often only indirectly part of the scenario, in which it is not their contours that get represented, but their function as receptacle for something else: their inner space in which something is placed (video #8 "reach in constituent"). The placing action gets represented in gesture, whereby a space is not always set up beforehand, and the gesture alludes only indirectly to the existence of a container which metaphorically provides an imaginary constituent / sentence space.

Another possible way to refer to grammatical forms and categories is to simply point to locations in gesture space, without evoking the idea of actually holding an item in one's hand. This strategy highlights the existence of an imaginary entity by assigning a place to it, or by placing it (Clark 2003). This may evolve along a horizontal axis and convey the order of adjacent elements (contiguity/indexicality/external metonymy). Or, when comparing two things or ideas, the speaker may set up two spaces, one to her left and one to her right. A third alternative is to place things randomly in gesture space, for instance when enumerating different elements. In the example below (figure 45, video 22), the speaker talks about different semantic roles and represents each category with a different gesture (we looked at the recipient gesture above; figure 30). This gesture can be interpreted to reflect the metaphor IDEAS ARE LOCATIONS; it can also be seen an instance of METONYMY OF PLACE (place for object; see also video #25). By dispersing the categories (gestures) in space, the evoked physical distance represents the conceptual distance between the different semantic roles and their respective functions (agent, patient, goal, recipient, experiencer).

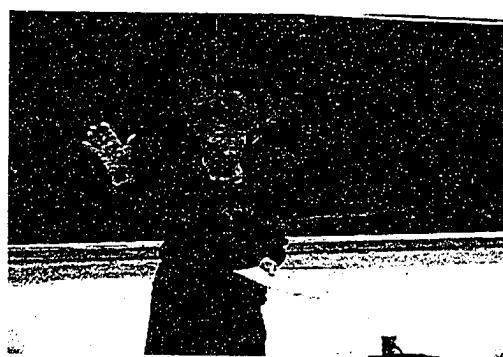


Figure 45: Semantic roles 'bounce around' (place for object)

Video #22

5.2.2 Gestural representations of the linear sentence model

Gestures reflecting linear conceptualizations of sentences characteristically tend to be similar to the ones mentioned above for smaller linguistic units, i.e. two relatively relaxed open hands held apart with palms facing each other. The hands are seemingly supporting an elongated *object* extending between them, or a bounded sentence domain, a *container* in which constituents may be placed or moved around. Hence the metaphorical concepts:

A SENTENCE IS AN OBJECT / CONTAINER or

A SENTENCE IS A LINEAR SEQUENCE OF OBJECTS

A SENTENCE IS A PATH WITH AN BEGINNING AND END

CONSTITUENTS ARE CONTENTS (Grady 1998)

A SENTENCE IS A LOCATION IN SPACE

CONCEPTUAL STRUCTURE IS PHYSICAL GEOMETRIC
STRUCTURE

(Sweetser 1998)

In the majority of cases, the sentence space is set up in the center of gesture space, right in front of the torso, somewhere between chest and waist. An alternative sentence gesture (ex. 19; see Figure 46 below, see also chapter IV) starts out with two hands joined at center, then moving laterally outward until both arms are fully extended, as if they were tracing a line, e.g. a string or chain of words (G1).

In this example, the speaker then seems to group elements with both hands drawing boundary-like contours of containers in a rather sketchy way along the previously set-up imaginary string (or path), moving from center to her right.



Video #8

(19) ((string of words))

So how do we know which complex syntactic units make up English sentences?

G1

bh lateral horizontal outward movement

so [we think of a sentence as a string of words ...]

G2

a

b

c

d

Bh sketchy objects, along the string (bracketing)

it's [obvious that we can group the words together in various ways].

The designated spaces between both hands (G2) seem to overlap as the hands move to the right. This might have to do with the fact that the speaker had just explained 'bracketing', a classification system according to which sentence elements are grouped into constituents with brackets that can encapsulate other bracketed constituents.

The same speaker demonstrates the word order change implied in transforming an active sentence into a passive by referring to the subject-object inversion as a 'flip-flop' (ex. 20 below). She produces a gesture starting out with both forearms held vertically and aligned with the shoulders, palms facing her body and fingertips pointing straight up. Then she crosses her arms over to illustrate the idea of switching elements around (G1).



(20) ((*flip-flop passive*))

G1

bh & arms vertical, cross-over
 [The passive basically flipflops _

G1 being held

the subject and object of the sentence, \
a=nd _

G1 still being held

(...) what we find out by forming this particular passive], _

G2 a b c

bh, pcoh-box, object gesture – held, move up and down
 is [that the string 'John's sister' forms a constituent.. \]

d e

still held, move up and down

namely the object of the verb, \

f

still held, move up and down

(..) and that's an object noun phrase] in fact. \

After the stroke on 'flipflops' the cross-gesture is being held while the speaker keeps explaining this kind of syntactic operation. She turns the torso rightward towards the overhead screen behind her, walks briefly towards the screen, then turns back and finally faces the audience again. Then her arms open up again and merge right into the next OBJECT/CONTAINER gesture (G2).

The previous two excerpts are good examples of the use of the *gesture hold*, which can be considered as marked in comparison to the unmarked flow

of fluid gestural forms, vanishing as quickly as they emerge and often melting into each other.⁴⁷ This is an interesting phenomenon in the teaching context. By holding a gesture, the teacher makes the concept interactively available for longer than usual. Teacher and students can contemplate a gestural form, which may help them keep their attention on the phenomenon in question and reason about it. Gesture holds, seen as a sort of classroom practice, may serve to compensate for the lack of genuine objects of contemplation or manipulation in linguistics courses – apart from words written on the blackboard. They are also a reminder that a gestural sign does not exist detached from the human body, and is as such different from most other human visual signs that can be interpreted when disconnected in space and time from their creator. These effects definitely merit further investigation in the particular context of knowledge mediation.

5.2.3 Linguistic theories: Complex metaphorical constructs

The fact that metaphoric gestures figure predominantly in academic discourse revolving around abstract notions might not be surprising per se. Central in this context is, however, the fact that linguistic terminologies and theories are themselves often based on specific sets of metaphors. The underlying mappings are not always intuitive, and making sense of the corresponding gestures requires knowledge of the theory behind the explanations. The data discussed below cover different approaches to grammar, ranging from discourse-based to generative. It is important to realize that there is a clear difference, often stressed by the instructors, between viewing a sentence as a horizontally elongated entity extending from left to right (as in the examples

⁴⁷ I thank Linda Waugh for pointing out these markedness relations.

above) and those representations that depict hierarchical sentence structures along both the horizontal and vertical axes. These different models are, as I will demonstrate, clearly distinguishable in the instructors' gestures.

A) Generative Grammar: Trees and dominance

The characteristic feature of syntactic tree diagrams is a schematic downward branching structure. The conceptual relation between categories are brought to light, with the most powerful, governing elements at the top and the dominated, subordinated elements at lower levels (a top-bottom structure is superimposed onto a front-back sequence of syntactic elements). We have already examined several examples of this view of grammar. To account for gestures that reflect such tree structure diagrams, we thus need to integrate the following mappings:

SYNTACTIC STRUCTURES ARE SPATIAL STRUCTURES

CONCEPTUAL STRUCTURE IS PHYSICAL GEOMETRIC
STRUCTURE

(Sweetser 1998)

HAVING CONTROL IS UP / BEING SUBJECT TO CONTROL IS
DOWN
HIGH STATUS / POWER IS UP

(Lakoff & Johnson 1980; Sweetser 1998)

Within this framework, dependent clauses are typically depicted by a hand sketching a branch that extends toward the lower right of the speaker. It seems that the tree structure provides slots in gesture space where constituents and embedded clauses can be 'plugged in.' As is illustrated in example 21 below, embeddedness is thus not represented in terms of

encapsulation (bracketing), but as a diagonal line continuing towards the ground (see also video #37).



(21) ((*wavy embedded clauses*))

G1 a b
... [but this is gonna be another **one** with embedded **sentences**
 c G2
coming in **verb phrases**][all the way **down**].

The following example (ex. 22) illustrates two ways of conveying the idea of hierarchy: either by referring to the nature of the *spatial* hierarchy simultaneously in gesture and speech ('going up...', G1) or by referring to the tree structure model only in the gesture modality and not in speech as in G4d (by drawing a line from an imaginary higher node down to a lower one on the mention of 'seeing' preceding the idea of dominance). It seems that through this division of labor between the two modalities the metaphorical concept POWER IS UP manifests itself as a blend of compatible metaphorical models. The syntactic tree model is a blend of a social and spatial hierarchy. Whereas in the gesture modality aspects of the spatial hierarchy are expressed by diagonal up-down motions, abstract notions from the domain of social systems – such as dominance, government, and sub-ordination – occur in speech in order to refer to the syntactic behavior of constituents.

(22) ((*dominance, tree, summary*))

... about reflexive pronouns... we actually need syntactic structure ..

G1

G2

[we need to be able to refer to] [going up to that]

G3 a b c
first dominating [node... branch* (...) branching node

d G4
that dominates the ante][cedent and seeing whether it]
dominates the reflexive as well.

so there are conditions on reflexives that go beyond

G5 a
[being in the same clause or prec* .. have having to do
with pre]cedence relations (...);

G6 G7
[they actually do make reference] [to this internal structure].

Another possibility to embody the tree metaphor is to illustrate the branching process by forming a triangle with both forearms held diagonally, elbows extended to the sides and both hands joined at the top of the evoked pyramid (as in G6). A variant is represented in (G7, figure 46) where just one arm is held in the same diagonal fashion. Again, the fact that 'this internal structure' is to be understood with reference to the hierarchical tree model is only specified in the gesture modality.



Figure 46: Tree branch representing "internal structure"

B) Emergent Grammar: Form coming out of use

Another theoretical approach to grammar covered in the data of this study is Emergent Grammar (Hopper 1998; Larsen-Freeman 2002). This framework sees linguistic form as being motivated and shaped by discourse-pragmatic forces, that is, by language use. It questions whether there are in fact a priori categories such as nouns and verbs. The speaker who represents this view argues that grammar is not static, but a dynamic system and that it should be taught as such in the context of second language acquisition. The following excerpt (ex. 23) gives an idea of this understanding of grammar.

Video 16

(23) ((emergent grammar))

... maybe a too radical departure for you from the normal way of looking at how grammar is acquired

G1	G2	G3
----	----	----

but it does not see [grammar as a thing] [that you get] [and then use]

G4

[it sees the use and grammar together (...)] [grammar coming out of the use (...)]

G5

G6
you] learn [by doing]

rather than

G7

[you learn first the rules and then you do them] ...

G8

[it blurs the boundary between (...) [learning and doing]."

G9

Especially important here is the contrast between grammar seen as a 'thing' (G1), represented as an object held between two hands that one can 'get' (G2, both hands form a fist) on the one hand and the 'use' of grammar (G3) on the other. The contrast is illustrated by referring to two different locations in space, one on each side of the speaker, which, metaphorically, stand for two conceptual spaces (Sweetser 1998). The gesture illustrating the idea of 'emergence' (G4) consists of a left (non-dominant) palm-up open hand with slightly curled fingers forming a sort of receptacle and the right hand being held above the left hand (see Figure 47). The fingers of the upper hand are drawing horizontally oriented circles (seemingly stirring something), and on 'coming out of' the lower hand approaches the upper hand, signifying that something emerges from below.

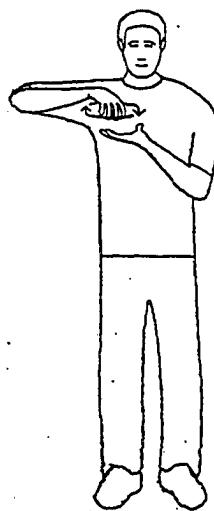


Figure 47: Emergent Grammar (patterns as emerging out of language use)

Actions such as 'doing' (G6) and 'learning and doing' are represented with a rotation gesture produced with both hands revolving around each other. The idea that boundaries between grammar and use are blurred is represented by two hands apart palms facing each other (like the container gesture) which then are pushed towards each other (G9).

C) Grammatical Relations: Arch structures and multiattachment

The third theoretical view of grammar covered in the data is that of Grammatical Relations (Perlmutter 1983). This theory too has its own notational system and diagrammatic way of representing sentence structure. The diagrams are often compared to igloos or umbrellas, and this kind of arch-like structure also figures in the gesticulation accompanying explanations of grammatical relations. Here is an example of what is called

'multiattachment' (expressing that subject and reflexive pronoun refer to the same person):

Video #24

(24) ((*multiattachment*))

... this would have a diagram where you have (..)

G1 G2
 [an initial one] [and two] (...)

 G3
 [this is my **multiattachment gesture**].

The gesture starts out with both hands at center, then the right (dominant) hand rises to head level and comes down while making a slight arch-like swing to the right (G1). Then the left hand rises and makes a shorter arch-like movement downward (G2). What follows is a 'meta-gestural' comment: the speaker points out her 'multiattachment gesture' (G3). To illustrate this, both hands raise up once again, come together at head level, and then go down the same arch-like path. The same gesture repeats itself (see Figure 48). In the videotape one sees the corresponding diagram on the blackboard in the background of the speaker; it shows exactly the kind of lines that the speaker draws in the air. They visualize syntactic relations in terms of spatial structure: schematic arch-like lines cutting through several zones layered on top of each other.

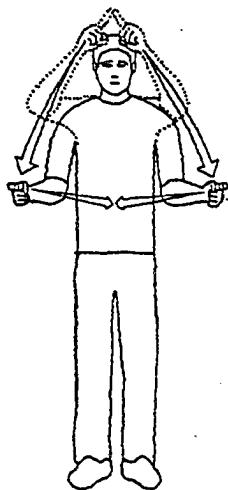


Figure 48: Grammatical Relations (multiattachment as an arch-like structure)

Gestural diagrams in the linguistics classroom can thus be said to originate, at least partly, in conventionalized and formalized diagrams proposed in articles, textbooks as well as reproduced on blackboards, overhead transparencies, etc. However, the theory of emergent grammar does not have standardized diagrams, which might be a reason why the speakers who try to explain this framework need to be more creative in their linguistic and gestural descriptions of the idea of emerging patterns (Figure 47).

5.3 Weaving the threads: Contiguity relations within metaphor

To recapitulate some central issues I will now turn to a short sequence exhibiting several of the modes and interactions discussed above (a longer version of this clip was provided above). In the excerpt below, the speaker summarizes the differences between non-generative and generative accounts of reflexive verbs by stressing the fact that matters of precedence (linear combination, adjacency) do not suffice to explain the logical underpinnings of such anaphoric processes. Instead, hierarchical relations need to be considered. In the gesture modality, the different conceptions manifest themselves as follows: the first gesture (G1) resembles the object-idea gesture. The clause is depicted as a bounded space by two open hands, palms facing each other and seemingly holding an object between them. Gesture 1 then segues into a slight variation incorporating movement: both hands (G2) remain in the same configuration and are moved toward the left of the speaker (i.e., towards the beginning of the imaginary sentence) just before the mention of 'prec' (precedence), here referring to the idea that the antecedent precedes the relative pronoun. The two hands shift back and forth one more time in the same fashion.



(25) ((internal structur))

so there are conditions on reflexives that go beyo=nd

G7

G8

pvo_h, bh pvo_h, bh shift left, then twice back and forth

[being in the same clause or prec* .. have having to do with
pre]cedence relations (...);

G9	G10
bh joint at eye-level, arms/elbows outward (triangle) only rh & [they actually do make reference]	arm held diagonally [to this internal structure].

Subsequently, a switch to the tree metaphor occurs in the gesture modality. This switch, however, is not equally perceivable in the speech content which is not metaphoric and only expresses the need 'to make reference.' G3 illustrates a tree chunk by forming a triangle with both hands joined at center top, forearms held diagonally with elbows extended to either side. A variant occurs in G4, where just the right arm is used in the same diagonal way. Note the fact that "this internal structure" must be understood in reference to the hierarchical tree model and is only specified in the gesture modality.

It is also noteworthy that the gesture stroke in G4 coincides with the mention of the demonstrative pronoun 'this', which belongs to the closed class category of shifters and is a highly polysemous deictic pro-form whose meaning is construed locally (Furuyama 2001: 22; Jakobson 1971: 131f.; cf. chapter I). Here the gestural sign contributes crucial aspects of the referent of 'this internal structure,' linking it visually to the concept of hierarchical sentence structure previously mentioned in the discourse and previously described with a similar gesture. A gesturally reinforced anaphoric process thus secures the interpretation of the demonstrative pronoun and the noun phrase it introduces. Obviously, the nonphysical object (the internal structure) is not present in the environment of the speaker, but due to an interaction of the indexical properties of both the demonstrative and the gesture, essential

properties of the structure referred to are embodied (via metaphor) and thus made present in perceptual space.

As has become clear in the course on this study, gesture allows the graphic representation of different types of relations and their translation from conceptual to gesture space. Jakobson's view thus supports what we said above when first discussing diagrammatic iconicity: the gesture modality provides direct (imagic / diagrammatic) translations of syntactic structures. Spontaneous representational gestures are not as symbolic, i.e., conventional, as linguistic signs and can create schematic images of the relations between different parts. As icons of relations, such diagrams point to the grammatical relations that operate behind the scene and that the instructor tries to make transparent in her presentation. The teacher divides the 'whole' of the framework being introduced into digestible parts while she advances in her discourse. Her goal is for the students to arrive at the 'bigger picture' with an understanding of the function of each part.

We can thus see the relevance to the present approach of how Jakobson was able to show that metonymy is a sub-type of indexicality which itself is based on contiguity, and of how metonymic and metaphoric processes seem to interact in the gesture data. In light of the metonymic relations and functions identified above, it appears that synecdoche, as a sub-type of metonymy, is particularly relevant to the mediation of meta-linguistic knowledge: through metonymic association, a morpheme can evoke the other morphemes in a given word, a part of a phrase (e.g., a preposition) can evoke the entire phrase, a clause the adjacent clause, a chunk of a tree the entire tree

diagram, a schematic movement the complex syntactic operation, and one theoretical concept the entire framework behind it. Vice-versa, larger constructs can stand for the parts they contain (cf. Jakobson 1963). Part-for-whole, whole-for-part, and part-for-part relationships thus are manifested at various levels and contribute to conceptual coherence within a metaphorically structured abstract domain and within the structure of academic prose (Jakobson 1956). In the gesture modality, speakers literally draw boundaries between units, or highlight how parts hang together forming a whole. Given these observations and the fact that gestures are always metonymic in their partiality of representation, we witness the workings of the *pars pro toto* principle which, according to Shapiro,

involves the differentiation of [a] totality. Differentiation [...] is precisely a singling out or individuation of constituents. However, metonymy is not differentiation pure and simple. A necessary concomitant is the relative ranking or hierarchization of the constituents [...]. One might even assert that the choice of the item singled out is perceptually and/or cognitively well-motivated (natural). (Shapiro 1983: 201)

In the section below, I will draw on contemporary cognitive theories of metonymy to illuminate a few additional metonymic modes and their functions.

5.4 Metonymic modes: Manual signposts for cognitive access

Given that metonymy is, just like metaphor, a cognitive process that can find expression in verbal and non-verbal modalities, this section will illuminate

some further ways in which gesture data have the potential to support theoretical claims primarily rooted in linguistic inquiry (cf. Barcelona 2000a/b; Coulson & Oakley 2003; Croft 1993; Dirven & Pörings 2002; Gibbs 1994, 1999; Lakoff 1987; Langacker 1993; Panther & Radden 1999; Panther & Thornburg 2003, 2004; Radden 2000; Radden & Kövecses 1999; Ruiz de Mendoza Ibáñez & Otal Campo 2002; Turner & Fauconnier 2002).⁴⁸

Despite the slightly differing theoretical views of what conceptual metonymy affords, there seems to be a consensus that whereas metaphor is based on cross-domain mappings, metonymy consists of mappings between a source content and a target content within one cognitive/experiential domain. On the basis of Lakoff's (1987) notion of idealized cognitive models (ICMs) and Langacker's (1993) work, Radden and Kövecses (1999: 21) maintain that "[m]etonymy is a cognitive process in which one conceptual entity, the vehicle, provides mental access to another conceptual entity, the target, within the same cognitive model." Building on this view, Panther and Thornburg (2003: 8) stress the central role of metonymies as "natural inference schemas," serving as guideposts in pragmatic reasoning, i.e. inferencing. The authors argue that

conceptual metonymies such as PART-WHOLE, CAUSE-EFFECT, PERSON-ROLE, REPRESENTATION-REPRESENTED, which have been dubbed *vital relations* by Fauconnier and Turner (2002: 93ff.), are concrete enough to serve as reasoning principles in utterance interpretation. We regard such metonymic relations as *multipurpose conceptual devices* not restricted to language but used in other semiotic

⁴⁸ Referring to Lakoff & Johnson (1980: 156-8), Barcelona (2000b: 5) stresses the fact that "both metaphor and metonymy are regarded in cognitive linguistics as *conventional mental mechanisms*, not to be confused with their expression, linguistic or otherwise. Metaphors and metonymies are often not verbalized, but can be expressed through gestures or other non-verbal communicative devices, or not communicated at all and simply motivate our behavior" (italics in the original).

systems and thought as well. (Panther & Thornburg 2004: 94/ 95; italics in the original)

With this in mind, I suggest that manual gestures can function, through metonymy, as visual guideposts triggering access to both imaginary concrete objects and abstract ideas.

Throughout this dissertation, I have presented support for the assumption that metonymic modes play a significant role in manual communication. As has been shown in previous work, synecdochic modes in particular seem to motivate formal aspects of representational gestures: signifying hands pick out salient parts of objects and actions, and, in doing so, provide schematic depictions of complex phenomena. Which features become highlighted can be determined by perceptive models, discourse-pragmatic forces, and what the hands actually come in contact with when handling physical objects (Bouvet 1997, 2001; Calbris 2003; LeBaron& Streeck 2000; Müller 1998, 2004; Sweetser 2001; Streeck 2003). While being physical, such manual signs are abstractions of the holistic gestalt they refer to, whether the relationship to their referent is predominantly iconic (holding an imaginary shoebox with both hands), or metaphoric (holding an imaginary infinitive in the same way).

Besides these formal properties of gestural signs, the data suggest that different types of metonymy serve distinct referential and pragmatic functions. For example, deictic gestures can, due to their indexical properties, also be regarded as surface manifestations of metonymic modes. In the data,

gestures indicating the location of grammatical categories within a sentence, i.e., a previously set-up imagined structure in perceptual space, may be said to entail metonymically motivated interpretations such as LOCATION-FOR-OBJECT and LOCATION-FOR-FUNCTION. In addition to such sign-object relations, the data exhibit various sign-sign relations based on (physical and conceptual) contiguity, combination, adjacency, etc. (Jakobson 1956). As both linguistic units and diagrams of sentences are structured wholes consisting of parts, we have been able to discern various synecdochic principles that bring to bear the coherence among the parts (e.g., PART-FOR-WHOLE, WHOLE-FOR-PART, PART-FOR-PART; cf. chapter 4; Jakobson 1963), which are cases of what Jakobson (1983) called *internal metonymy*.

Now, it appears that the idea of adjacency, or contact, can be instantiated in different ways. A container can metonymically stand in for its content (e.g., a form of a word for its content, Radden 2000: 103). As indicated above, an object or container can also evoke the adjacent object or container (e.g., a preposition can trigger the subsequent elements of a prepositional phrase), which is an instance of what Jakobson called *external metonymy* or *metonymy proper*. Another example of this from the data exhibits two hands, forming closed fists, held closely next to each other, with each of them seemingly containing a small object, one standing for a lexeme (e.g., 'teach-') and the other one standing for the grammatical morpheme (e.g., '-er'). The closeness of the two hands signifies the conceptual closeness of the two morphemes forming one word ('teach-er').

As noted before, the object/container gesture can also be interpreted as an instance of external metonymy. Two open hands (flat or slightly cupped with palms facing each other), seemingly holding an object, do not directly represent the object; rather, we have to imagine an object extending between the two hands. This holds for both physical and metaphorically construed abstract entities such as words or constituents. As a consequence, the addressees have to mentally fill in the blank, e.g., to imagine the concept referred to in speech filling the bounded space between the hands. We can thus assume a non-factual adjacency relation, e.g., contact, between the hands and the imaginary object. This can also be interpreted with a focus on the action the hands engage in: the action of holding something stands for the entity being involved in the same action (ACTION FOR OBJECT INVOLVED IN ACTION).

These phenomena suggest that gestural vehicles, i.e. hand shapes and movements, may serve as visual reference points (Langacker 1993) providing access to invisible abstract categories. To give another example, a flat palm-up open hand (Müller 2004) extended toward the audience and co-occurring with the mention of the word 'noun' also signifies the referent only indirectly: the hand (vehicle/source) serves as a surface on which the speaker seemingly presents a linguistic category (here the target 'noun'). The visible, concrete source, i.e. the manual articulators, triggers the abstract target concept which the addressee has to infer metonymically as sitting on the palm of the open hand (LOCATION-FOR-OBJECT; REPRESENTATION-FOR-REPRESENTED). While the associative relation between source and associated target is based on conceptual contiguity, the abstract notion is metaphorically construed as an

imaginary object. The gestural form embodies the source, thus making it visible, which supports the idea that in a metonymic process the source meaning remains present and perceptually salient, while the target meaning is conceptually prominent (Panther & Thornburg 2004: 95/96, 105ff.). In fact, the target is not only conceptually prominent (imagined), it is also reinforced in the concurrent speech. As Wilcox (2004: 20) observed regarding reference point construction in ASL, “[m]etonymy ensures that the addressee’s attention is directed to the right conceptual target. By using our reference-point ability, we can help the addressee evoke a concept that might be abstract or harder to comprehend (Langacker 1993: 30).”

The visual modality may thus provide cognitive access to the target concept by highlighting salient elements of a basic action model, or motor schema, abstracted from real-word actions and made available for the cognitive manipulation of abstract entities. Here, as well as in the example with the two fists (seemingly holding small objects, e.g., morphemes) mentioned earlier, the action of holding an object stands for the object itself.

The assumption that some metaphors are grounded in metonymy (Barcelona 2000b: 33; Geeraerts 2002: 461ff.; Goossens 1995: 171; Lodge 1977: 111ff.; Radden 2000: 93) holds up in regard to these seemingly intuitive ways of referring to single abstract entities and also in regard to more elaborate abstract constructs such as morphological and syntactic structure, as well as theoretical frameworks. From a Jakobsonian perspective, we can further say that there is a hierarchy of the different semiotic modes (similarity / contiguity and thus metaphor and metonymy) in each semiotic process.

CONCLUSION AND VISTAS

This dissertation was motivated by the question of how speakers employ linguistic and gestural means of expression to convey abstract phenomena. One of the initial observations was that the communication of abstract information (i.e., objects, places, and relations not immediately visible in the environment of the speaker) is, to a remarkable degree, supported by representational gestures. It has become clear in the course of the dissertation that, no matter how schematic or minimal this kind of semiotic aid might be, the visuo-dynamic characteristics of such semiotic acts engender various ways of making abstract and absent entities more graspable for the interpreter (e.g., a student, gesture analyst, etc.). Although gesture is a comparatively fluid medium, when drawn upon, it contributes visible action to the formulation of utterances and thus to the mediation of knowledge in teaching contexts. Based on multimodal usage data collected in linguistics classrooms, this work has offered a window into the morphological and dynamic characteristics and pragmatics of gestures that speakers produce when explaining grammatical phenomena and linguistic theories. In what follows, I will briefly summarize the main arguments and findings put forward above. I will then point to possible avenues of further research, and lastly, I will address epistemological implications of the approach to gesture taken here, in particular in regard to Peirce's semiotic theory.

1. Summary of findings

Regarding gestural representations of grammar, the findings of this study support the claim that gesture research can provide additional insights into embodied cognition and inform us about how humans conceptualize abstract concepts via iconicity and metaphor (Bouvet 2001; Calbris 1998, 2003; Cienki 1998; McNeill 1992; Müller 1998; Sweetser 1998; Taub 2001; P. Wilcox 2004; S. Wilcox 2004). Demonstrating how the gesture modality renders abstract spatial organization (e.g., grammatical categories and sentence structure) more concrete and tangible, the findings are in accord with what McNeill et al. (2001:12) maintain concerning descriptions of concrete spatial configurations (e.g. living space): "Gestures with hands are seen in abundance when people describe spatially organized information." While it has become evident that spatial metaphor is central to accessing abstract domains, a more complete picture of gestural differentiation of abstract concepts and the relations holding among them can be achieved, as I hope to have shown, by investigating the interplay of metaphor and metonymy, with iconicity interacting with both modes to various degrees. Examining the semiotic collaboration of these major figures of thought has proven to offer a way to account for distinct forms and pragmatic functions of representational gestures, thus complementing previous gesture research in more than one respect (Bouvet 2001; Kita 2000; McNeill 1992).

From a theoretical point of view, I proposed an approach that combines Peirce's (1955, 1960) and Jakobson's (1956, 1982, 1987) work with contemporary cognitive accounts of metaphor and metonymy. The

development of this approach started in the first chapter, where I laid out the semiotic foundations of this work, by first discussing Peirce's doctrine in detail and highlighting its relevance with regard to gesture analysis. In a second step, I described how Jakobson rooted parts of his theory of metaphor and metonymy in Peirce's work by developing his notion of metonymy out of Peirce's notion of contiguity. Presenting Peirce's system in detail had the goal of demonstrating that in fact only some of his major sign categories have been used in gesture research (iconics, metaphorics, deictics) and that various sub-categories of signs, sign-object relationships, and sign-interpretant relationships that he proposed have been neglected so far. Considering these sub-categories and looking at gesture through a more refined lens allowed me to literally see, from the perspective of the interpreter, more facets of gestural sign processes, and also to suggest semiotic mechanisms in gesture that had previously not been pointed out (e.g., the difference between qualisigns, sinsigns, and legisigns, between the immediate and the dynamic object, and between different types of iconicity and indexiality).

As demonstrated in chapters III and IV, the different sub-types of icons introduced by Peirce were identified in the data. Within the predominantly metaphorical gestures, image iconicity, diagrammatic iconicity, and metaphor iconicity work together in one way or another in bringing into relief different aspects of figurative conceptualizations of linguistic form and structure. I further distinguished between three types of diagrammatic iconicity in such metaphorical gestures: image-iconic diagrams, relational diagram, and structural diagram.

One of the central questions that has arisen in the course of this work concerns the gestural sign's potential for achieving legisign status, that is, of having law-like properties. The issue is whether gesture interpretation engages the level of thirdness, and here in particular, whether teachers in a linguistics classroom deal with legisigns. It has been suggested elsewhere (LeBaron & Streeck 2000) that the repeated use of certain gestural forms with certain speech contents may entail a gradual habituation process and thus an increasing degree of symbolization. In light of what has been proposed in this dissertation, we can also say that gestures may reflect conceptual images of the things being repeatedly talked about in a given context. These conceptual images may be determined by concrete objects (and their image-schematic counterparts), or, in the case of abstract subject matters, they may be determined, as has been discussed at length above, via metaphor. Representing abstract ideas as imaginary physical objects that one can manipulate exemplifies only one of the conventional metaphorical understandings that appear in the gesture modality throughout the data. If we agree with Danaher (1998; cf. chapters III and IV above) that image schemata are iconic symbols, we can say that some of the gestures that appear (in slight variations, of course) over and over again derive their symbolic characteristics from mirroring such iconic symbols. If gestures take on dimensions of thirdness, those are probably not assumed at the level of consciousness (just as language is not conscious, either). Also, things probably work differently for the teachers who produce the gestures, as opposed to the students who are exposed to them. For the teachers, their gestural illustrations might go with the ideas and thus feel like legisigns, but for the students, who are not aware of the system or are not habituated to it, it might in each case involve active

interpretation engaging first and foremost the realm of firstness and secondness. Only through habituation can they become part of thirdness. Although these issues still call for further investigation, my sense is that image schemata and conceptual metaphor can be assumed to guide the gestural, embodied rendition of abstract concepts and their interpretation.

The array of salient hand shapes and motion patterns that have emerged from the data evoke a number of the image schemata proposed in the cognitive linguistics literature (Johnson 1987; discussed in chapter V). They can serve as a form of visual evidence for the ways in which the theory of embodiment views cognitive structures as resulting from habitual embodied experiences (Gibbs 2003; Richardson et al. 2003). Image schemata and conceptual metaphors are assumed to reflect cognitive habits which can be understood as sedimentations of dynamic, recurrent interactions with the physical and social world. If it holds that they provide frameworks of semiotic translation for the interpretation of signs (here, linguistic and concurrent gestural signs), we can make a link, — as Danaher did, and I elaborated with respect to gesture — between these interpretative frameworks and abduction. With reference to Eco (1986), I suggested that not only can conventional metaphors be assumed to be counted as instances of overcoded abduction, but that gestures can provide visual support in the abductive process of interpretation of abstract phenomena that cannot be directly accessed, but require a cognitive/semiotic detour. This can also be a reason why speakers make visible semiotic efforts to convey such phenomena. Put differently, as abstract entities are not part of the immediate speech context, it seems that speakers make additional efforts of reference and contextualization by

bringing in visual aids (comparable to what Hutchins (2002) calls material anchors) such as words and diagrams written on blackboards and screens and also by using their hands and arms to illustrate what they have in mind.

As we have seen above, such mechanisms of reference and contextualization would not be possible without the interaction of icons and indices. When iconic symbols such as nouns, verbs, and other open-class elements are combined in propositions, they rely on the contexture provided by indexical symbols such as deictic pronouns, demonstratives, and other closed-class function words (Danaher 1998). Through the combination (typically based on contiguity, according to Jakobson 1956) of these different signs, a proposition is formed and a claim can be made. In the case of abstract notions, the image that is evoked in the mind of the interpreter is different from the image that a concrete object might evoke, since there is not a comparable experiential base for abstract entities and that is why we rely on the creation of parallelism between an abstract notion and a more concrete notion to understand the properties and behavior of the former.

The subjects of this study do not only produce a gesture once in a while to illustrate or emphasize an idea. On the contrary, the occurrence of representational gestures is so dense that they often meld into one another and fulfill several functions at the same time (such as representing, accentuating, calling on students, etc.). Given this strikingly high occurrence of gestures accompanying meta-grammatical explanations, it seems to me that gestures, due to their indexical nature and their existential linkage to the here and now of the speech event, are used to support the contextualization of

abstract concepts in the ongoing discourse and also in the construction of an abstract knowledge domain. Contiguity relations, not only between sign and its objects but also between concepts, as I have argued above, are made visible by gestural depictions of spatial arrangements (linear and hierarchical) of signs (combination/contexture, according to Jakobson), be it by gestural movements linking ideas or by the relationship between two hands held next to each other. In doing so, they have the potential of evoking aspects of the cognitive architecture that seems to underlie conceptualizations of abstract structures. In other words, gestures may visually evoke not only the elements referred to (linguistic categories, parts of speech, etc.), but also the way those elements are combined, i.e., the grammar underpinning those constructs (linear sentences, tree diagrams, etc.). With reference to Jakobson's essay on grammar and geometry, I argued that gestures bring out the geometric/spatial/diagrammatic dimensions of grammar, highlighting the difference between "lexical tropes" (icons) and "grammatical figures" (indices). They further evidence the abstractive power of the mind which allows not only for the constitution of gestural signs, but also for their interpretation.

In his theory of metaphor and metonymy as the two major modes of association and signification, Jakobson assigned an important place to metonymy. As we have seen above, message signs (such as paintings, poems, discourses, etc.) can have either a predominantly metaphoric or metonymic character. The examples chosen in this study to illuminate the semiotic tendencies proposed by Jakobson included a Cubist painting by George Braque and a surrealist painting by Salvador Dali. It was pointed out that

while a cubist painting can be regarded, in its entirety, as a metaphorical rendition of its object (total metaphor), the structuring principles that hold together the tissue of objects decomposed in geometric forms is metonymy. Approaching bit by bit the conceptual image she might have of "A Young Girl With a Guitar," the viewer is required to (re)construct the image by joining the represented fragments of the object. The meaning of such a painting can only be derived by understanding the idiosyncratic semiotic code of a given picture, in which objects are depicted by some of their essential characteristics (salient forms, letters, etc.). When interpreting representational gestures, the interpreter is also confronted with signifiers that convey the essential features of an object or an action, except that the indexical nature of gestures secures a direct link with habitual object manipulation and other mundane experiences. The link between object and gestural sign is thus comparatively translucent (Bouvet 2001) and seems to be motivated, at least in certain cases, by image schemata and their metonymic and metaphoric extensions.

In cognitive linguistics, the relatively recent rehabilitation of metonymy has in part been inspired by Jakobson's ideas (cf. chapter 5.3; Dirven & Pörings 2002). In the cognitive linguistics literature, Jakobson's distinction between internal metonymy ("metonymy proper" / synecdoche) and external metonymy (adjacency, contact, contexture) has not received as much attention as the operations of selection and combination have. However, it indeed has proven to be useful in distinguishing different modes of indexicality in the gesture modality. One of the contributions that this work makes to the field of gesture studies consists in introducing different types of metonymy and synecdoche in gesture, thus attesting to the central – and previously

underestimated – role that metonymy plays in both the formation of gestural signs and their communicative functions. While metaphor is indispensable in representing concepts and their relations (IDEAS ARE OBJECTS, CATEGORIES ARE CONTAINERS, CONSTITUENTS ARE CONTENTS, CONCEPTUAL STRUCTURE IS PHYSICAL GEOMETRIC STRUCTURE, TIME IS SPACE, IDEAS ARE LOCATIONS IN SPACE, HAVING CONTROL IS UP / BEING SUBJECT TO CONTROL IS DOWN, FORM IS MOTION etc.; Grady, Johnson, Lakoff, Sweetser), the iconic modes exemplified in chapters 3 and 4 clearly do not suffice to explain the fundamental semantic processes observed in the data. As we have seen above, metonymy not only plays a role in the formation of gestural signs (Bouvet 2001, Müller 1998), but also fulfils several distinct functions in terms of indirect reference and conceptual / discursive coherence. Metonymical processes engender the conceptual contiguity holding among combined elements (in words, phrases, clauses, sentences, discourses, sentence diagrams, etc.). Based on these observations, I identified the following contiguity / metonymy relations in co-speech gesture:

A) *Pointing gestures* (concrete and abstract) [DEXIS];

B) *Contextualization / combination / relation*: gestural movements that link single contiguous/ adjacent items (icons); relation holding between two adjacent signs produced with two different hands (adjacency)
 [structural/ diagrammatic contiguity / EXTERNAL METONYMY
 (Jakobson)] [METONYMY OF PLACE]

C) *Reference points, indirect reference*: hands stand for objects they seemingly hold (adjacency / contact). Hand action stands for object involved in action; the act of presentation stands for presented item [referential EXTERNAL METONYMY (Jakobson)]

D) *Relation to body parts*: Gestures that derive some semantic features from the body part close to which they are produced [referential EXTERNAL METONYMY (Jakobson) / METONYMY OF PLACE]

In view of recent theories of conceptual metonymy (among others, Langacker 1993; Panther & Thornburg 2004), I further argued that manual sign vehicles, e.g., a palm up open hand, may be regarded as visual signposts that trigger cognitive access of target concepts by literally pointing the interpreting mind to the imaginary object being held or presented by the hand (e.g., a palm up open hand points to a metaphorically construed abstract entity such as a verb seemingly sitting on the surface created by the palm). This observation is supported by the following metonymic (inferential) modes that have been discerned in the gesture data: LOCATION FOR OBJECT, PRESENTATION FOR PRESENTED, PART FOR WHOLE, WHOLE FOR PART, ACTION FOR OBJECT INVOLVED IN ACTION, etc.

While it still needs to be investigated whether such metonymic processes, and their interaction with metaphor, are instantiated in the mediation of theories and practices in other knowledge domains, the findings presented in the dissertation suggest that accounting for metonymy in gesture may

illuminate links between habitual bodily acts, the abstractive power of the mind, and interpretative/inferential processes.

2. Avenues for future research

In light of the findings presented here, I can see several avenues for future research. For instance, we need to gain a fuller understanding of how exactly motor schemas, in addition to image schemas, condition mental models of abstract concepts (cf. Richardson et al. 2001, 2003). Kita (2000: 146ff.) stresses the cognitive functions representational gestures may fulfill, assuming that they help organize and externalize analytical as well as spatio-motoric thinking. One observation that could support this claim is that teachers, in the videos of the present study, tend to gesture relatively strongly when they answer students' questions. That is, when they leave their prepared script and need to formulate spontaneous explanations. Another avenue would be to compare the tendencies documented here with other abstract subject matters (music, mathematics, physics, philosophy, etc.) in order to arrive at a more complete picture of how language, cognition, and the body turn abstract challenges into meaningful communication.

Based on my experience with gesture research so far, there are two topics that particularly interest me and would allow me to use the methodology and typologies developed in this dissertation to approach gesture from a perspective that places a stronger emphasis on cross-cultural aspects of multimodal communication. This would allow me to integrate the cognitive/semiotic modes identified above with those functions speech and

gesture perform in exhibiting, i.e., personifying, cultural identity and group membership. One way to approach these issues is to carry out cross-cultural investigations into spatial conceptualizations of abstract structure, including non-Western cultures and languages. A second concerns the interplay between language, gesture, personal histories, and cultural norms of behavior in bilinguals.

As far as the first possible research project is concerned, I could directly build on the multimodal research I have carried out so far. However, this would entail widening the scope by conducting cross-cultural investigation (Western and non-Western cultures) into conceptualizations of linguistic form and syntactic structures. Here I would examine the relation between mental models of abstract phenomena and cultural practices such as reading and writing. While the present work has shown that spatial metaphor is pervasive in such conceptualizations, the interaction with the TIME IS SPACE metaphor has still to be explored systematically. The goal is to provide linguistic and gestural evidence for the interrelatedness between the metaphorical structuring of space, time, and linguistic form. What is needed here is a methodology that allows us to discern the interaction between cognitive commonalities (image schemas, motor schemas, basic metaphors and metonymies) on the one hand and cultural differences (writing systems, reading/writing, etc.) on the other. In order to engage in such typological comparisons, one will need to collect data in various European languages (for example, English, French, Spanish, German, Russian, etc.) and non-European languages (for example, Japanese, Chinese, Korean, Arabic, Turkish, etc.). Considering indications that Mandarin speakers conceptualize time vertically

(Boroditsky 2001), the aim of this work would be to determine to what degree speech and gesture reveal a) vertical and/or horizontal dimensions of linguistic form, b) hierarchical structures that exploit both axes, and possibly c) front/back orientation. Boroditsky's experimental work on Mandarin speakers' vertical conceptualizations of time provides interesting impulses to investigate both western and non-western understandings of these relationships.

For the second project, the main interest is to examine the ways in which two cultures influence the use of (self-)expressive means within one and the same, bilingual person. Combining ecological and sociolinguistic perspectives, it would be worthwhile to build on previous investigations into language socialization in multi-lingual societies. The approach I would suggest is inspired by the work of Claire Kramsch (2002), which has offered insights into issues of subjectivity and identity in the social discursive construction of self in second language learning. As Kramsch points out, speakers create their own signs to refer to the world from their personal perspectives and histories. Gestures are no doubt among those signs, but have not received much scholarly attention in the context of bilingual studies. Given that language and culture jointly constitute a system of linguistic and non-linguistic signs, one of the questions that arise here concerns the degree to which a bilingual speaker, when switching from one language to another, changes her or his way of drawing on linguistic and gestural means in the portrayal of cultural identity, beliefs, stances, emotions, and so forth. Of particular interest will be the identification of differences regarding the extent to which the manual movements of a speaker exploit the space around her,

not only in relation to her own body, but also in terms of advancing into the interpersonal space between herself and her interlocutor(s). Another part of the analysis will consist in documenting the use of culturally-codified, symbolic gestures (emblems), paying attention to potential instances of 'gestural code-switching.' One might also want to examine whether instances of linguistic code-switching are marked by manual movements. These issues will take the insight gained in the present work several steps further into the field of anthropological and ecological linguistics.

3. Epistemological considerations

To conclude this dissertation, I would like to address some epistemological considerations that have, as it becomes ever so clear in retrospect, shaped this study and that take us back to the main tenets of Peirce's pragmaticist doctrine of signs. Peirce's general semiotic theory appeared apt to be applied to gesture because it was not developed for language but instead has a much wider range of applicability. Given that gestures are semiotic acts, embedded in the spontaneous formation of utterances and entire discourses, they can only be studied in light of their pragmatic characteristics and functions. Due to the architectural disposition of Peirce's system, I was able not only to discern and classify various distinct semiotic modes that constitute and structure multimodal messages, but also to shed light on the functions of co-speech gestures as communicative acts within these bi-modal systems.

Gestures (as language) can only be described pragmatically. The fact that they represent visible speech acts makes them the ideal semiotic system to

test Peirce's doctrine and to demarcate possible limitations. Whereas the different categories of iconicity Peirce proposed seemed to be sufficient to describe the different iconic modes observed in the data, accounting for all the different indexical modes called, as was demonstrated above, for the introduction of several sub-categories of indexicality. Here Jakobson's distinction of several metonymic modes proved to be extremely useful. Through the pragmatics of gestures, one can show the degree to which Peirce's semiotic is pertinent and coherent, and one step to follow this rational would be to examine in more detail the ways in which these insights can be incorporated in the theories of speech acts (Austin) and relevance (Sperber/Wilson).

To come back to the image of the Greek vase provided at the beginning of this work, we can now see why it is difficult for us to find out what the gestures produced by the figures on the vase actually mean. First, there is the historical distance between the cultural context in which the vase was created and our own cultural context. Without studying the representational traditions of that period, we can only guess at what the constellation of the figures, their postures and (frozen) hand movements might signify. Also, the vase is a purely visual medium — static, not dynamic — and we thus find ourselves deprived of the speech context of the depicted scene and the dynamic unfolding of the gestures with the speech. In order to decipher the gestural code, it is necessary to consult sources (Müller 1998), which inform us that the ring gesture figuring prominently on the vase is in fact a common meta-linguistic gesture indicating a speech act. It signifies that the person who makes this gesture is speaking, or about to speak, and is thus a rhetorical

gesture par excellence. Interestingly, slight variations in terms of form and orientation of the hand entail semantic differences. For example, when the hand exhibiting the ring gesture is held as straight as it is on the vase, it may signify that the speaker is about to start to speak or is at the beginning of his discourse. The more the hand is tilted towards the interlocutor, the more advanced the speaker is in his discourse, or the more directly he addresses his interlocutor (e.g., by accusing him). Since the time the vase was created, the ring gesture has been documented in Europe and the Middle East, with culturally-dependent meanings and uses. Nowadays, it often signifies the idea of precision or importance; its meaning thus relies on a metaphorical interpretation.

Compared to this gestural scene without words, the multimodal discourse investigated in this study is strikingly dynamic, immediate, and engaging. Studying bodily semiotics from the angle proposed here sheds light, as I hope to have shown, on the externalization (or *ex*-bodiment) of mental imagery, knowledge structures, and bodily experiences (*habitus* and *bodily hexis*, Bourdieu 1991), which uses, just as embodiment does, the body as the medium through which these bi-directional processes of abstraction and concretization are channelled. The human body thus functions as the locus where cognitive/semiotic modes take shape, linking knowledge and linguistic/visible action in the formation of utterances, and providing anchorage for thought and theory in both physical surroundings and socio-cultural practices.

APPENDIX

APPENDIX I: Modes of iconicity and metaphoricity (Peirce & CMT): Adaptation for gesture

(CMT: Cognitive Metaphor Theory; IS: image schema SD: source domain; TD: target domain; G: gesture)
 (Table is to be read bottom-up)

<i>modes of iconicity (Peirce) (similarity)</i>	<i>Semiotic / cognitive principles</i>	<i>gestural representation (meta-grammatical data)</i>	<i>gesture research</i>
<i>metaphoric iconicity</i> highest degree of abstraction (thirdness)	<ul style="list-style-type: none"> - conceptual metaphors: cognitive symbols; interpretative framework for translation from one sign system into another => meaning (interpretant) - SD structures TD / metaphorical extension of image schemata - based on perceived parallelism between two concepts (Peirce) 	<p>Gs refer to abstract concepts; depict aspects of concrete SD [CMT] (imaginary object); even if the concurrent word (such as "noun") is not per se metaphoric, but rather technical</p> <p>Subset of metaphorical Gs (thirdness) are metaphors built on metaphors; highest level of abstraction (ling. theories)</p> <ul style="list-style-type: none"> - Gs help in the abductive process of inference by providing visual concrete/literal side of mapping 	<i>metaphorics</i> (McNeill) Calbris Cienki Müller Bouvet Sweetser: secondary iconicity Taub: ASL double mapping
<i>interaction of image iconicity and diagrammatic iconicity</i> => as part of abstraction/ schematization process [& indexicality (contiguity) (also secondness)]	<p>↑ Metaphorical Projection CMT: IMAGE-SCHBMATA</p> <ul style="list-style-type: none"> - IS resulting from habitual interaction with environment, objects, space, etc.; - IS have internal structure (part-whole) - IS: iconic symbols: habit/ abstraction/ codification [Danaher] - (ICONS plus) INDICES: interactive responses to the environment => habit => schema/ structure [Danaher] - indexicality based on contiguity, results in metonymy/ synecdoche, creates contexture/ structure 	<ul style="list-style-type: none"> - schematic images (partly geomateric patterns) found in gesture data: object, container, source-path-goal, surface, balance, scale, circle, triangle, waves, vertical/ horizontal lines, falling/ rising diagonals, etc. - dynamic, sensory-motor dimensions of concepts 	<i>Müller</i> Bouvet (synecdoche in gestural sign constitution) Taub: schematization process (ASL)

JAKOBSON]

APPENDIX I continued

<p><i>diagrammatic iconicity</i></p> <p>higher degree of abstraction (secondness)</p>	<ul style="list-style-type: none"> - icons of relations: schematically depict the relationships among parts within a whole (organizational structure of multiple signs) - visual diagrams: apt to represent hierarchical / spatial relationships / abstraction/ generalization/ essence - economy/ efficiency motivation/isomorphism (Haiman) - isomorphic iconicity (language) consistency of form-meaning relation across words (Waugh) 	<p>Subset of metaphorical gestures (secondness) are <i>diagrams</i>:</p> <ol style="list-style-type: none"> 1) both hands hold one 'object' each next to each other, pointing (index) to relation between them (adjacency, contiguity) 2) ad hoc graphs/ grids depicting (hidden) abstract relations among words in a sentence; pointing to places of ling. items in gesture space (=> function of unit); [relational diagram] 3) gestural diagrams that are reflections of established representations of sentence structure (tree diagrams); Image of diagram [image-iconic diagram]; closer to <i>image iconicity</i> 	<p>Enfield: diagrams of kinship relations</p>
<p><i>image iconicity</i></p> <p>(firstness)</p>	<ul style="list-style-type: none"> - similarity of a single sign and its object is easily perceptible <p>-----</p> <p>Abduction: hypotheses, inferences Eco: overcoded/ undercoded abduction</p>	<ul style="list-style-type: none"> - Gestures of concrete objects and actions (literal rendition) <p>Subset of metaphorical Gs (firstness) are <i>images</i>:</p> <p>depict properties of (single) abstract objects / operations (object gesture, flip-flop)</p> <p>-Important to note: all meta-grammatical Gs are metaphoric in nature (based on parallelism between the abstract domain of grammatical thought & the embodied rendition) [Peirce]</p>	<p>McNeill: <i>iconics</i></p> <p>Sweetser: <i>direct primary iconicity</i></p> <p>Taub: image selection, single mapping (ASL)</p> <p>ICONIC/GROUND</p> <p>INDEXICAL/GROUND</p>

Appendix II: Salient hand shapes and movements

	PUOH-TRAY	PUOH-CUP
Speaker	M	E
Name of Clip	Category Mismatch	Bound Morpheme String
Specified Name of Salient Feature	puoh-tray-rh	puoh-cup-lh
Quote from gesture	(..) because, / (..) Darwinism, / (..) is also a noun, \	... Of course <i>some bound morphemes</i> , \
Meaning/Idea behind quote as linked to gesture		Cupped hand seems to indicate the objectification of morphemes.
Speaker	M	M
Name of Clip		comp, compl. Clause (Syntax 3)
Specified Name of Salient Feature		puoh-cup-rh
Quote from gesture		(...) we're going to call that wo=rd, / (..) a complimentizer, \ (..) because it introduces a complement clause... \
Meaning/Idea behind quote as linked to gesture		M seems to present the compliment clause as if it is an object she holds in her hand.
Speaker	L	L
Name of Clip		phoneme functions
Specified Name of Salient Feature		puoh-cup-lh
Quote from gesture		(..) phonemes, / (..) function, _ (..) to differentiate between wo=rds, _ which are different in meaning, \
Meaning/Idea behind quote as linked to gesture		M seems to present the idea of a phoneme as an object in her hand.

Appendix II (continued)

PFOH-STOP	PFOH-LID	PFOH-CLAW
E	L	E
Organize structure of sentence	above and below sentence level	Core and head of NP
pfoh-stop-bh	pfoh-lid-lh	pfoh-claw-rh
... the point is that (...) there's an organizational struc / \ ture, \ (...) which operates on lots of different levels, \ (...) and that organization structure isn't one of just, / this is next to that is next to that is next to that \	(..) Lithe=lians, _ (..) basically took the sentence as, _ (..) their, / (..) t-, / (..) maximum level of analysis, \	and this (...) noun (...) is called the head, _ (..) of that noun phrase. \
Moves hands downward to describe the multiple ways of decomposing sentence structures	gesture alludes to the abstract notion of "maximum" via the physical physical indication of the vertically-highest level.	alludes to the head with the claw-like shape of the right hand against the board on which he was just pointing to particular sentences. NOTE: lh is in the shape of what looks like a head before gesture occurs and while it is occurring
M	M	
passive move object upstairs	String of Words (Syntax 1)	
pfoh-stop-lh	pfoh-lid-lh	
... Uh, / that's the active form, _ (..) I can passivite that and say, (..) Janine was kicked, _ (..) by M, \	if we take into account that sentences aren't simply strings of wo=rds, \	
Pre-gesture context missing is missing from the clip, but M appears to be contrasting the fact that it's the active form from a different passive form, before explaining how it can be passivised	This might actually be a good example of "unintended" gestures: usually their presence signals some other meaning, which is absent in this clip.	
D	E	
phrasal verbs particle order	mind operates at higher levels	
pfoh-stop-rh	pfoh-lid-bh	
... -Uncht, / using the it, / or using a pronoun, _ only between the verb and particle, _ (..) not after the particle... \	... So your mi=nd is racing ahead, \ your mind is putting it all together, \ your mind is operating at a much higher level, \ (..) than saying first this word, \ then that word and this word... \	
D uses open hands with slightly curved fingers to represent the places in the sentence where the pronoun can fit in the sentence structure	Vertical height indicates increased complexity at which mind operates.	

Appendix II (continued)

PCOH-BLADE	I-T-MEASURE	FIST
E	D	D
divisions in sentences	phrasal verbs particle order	chunks, morphemes, strategies
pcoh-blade-lh	i-t-measure-rh	fist-bh
I'm asking if you have an intuition, / (..) about where, / (..) if there <i>were just</i> a single division, \ (..) it would appear... \ 	"using the it or using a pronoun"	who is really trying, \ starting out with his L one, - trying different strategies, \ lo- landing on some chunks, \ some monomorphemes, \ that don't, / unanalyzed don't, \
Blade gesture makes a division in the physical space in front of speaker by slicing the air into two parts.	small space between index finger and thumb indicates the compact nature of "it" or other such pronouns, thus denoting their functional use in the sentence	Fist indicates objectification/solidification of monomorphemes
D	E	D
pseudo-cleft fronting focusing	sentence stream of noise	emergent grammar (fist)
pcoh-blade-rh	i-t-measure bh	pcoh-fist-lh/rh (separately)
so it's a way of fronting, - (..) <i>topicalizing</i> , - (..) and uh focusing, \ it's a focus construction, -	"a continuous stream of noise"	grammar emerges from, / (..) language use, / not from <i>knowledge</i> becoming <i>automatized</i> . \
Blade seems to indicate topicalization by drawing a definite boundary/division in the air. NOTE: Interesting to take a look at how D moves quickly between hand gestures to represent the three separate points: fronting, topicalizing, and focusing.	Moves outward from body center with the measure handshape in both hands to denote the metaphorical "stream"	Fist might have multiple meanings in this gesture: In beginning of gesture, fist seems to be used to emphasize the negative (this happens across speakers -- fingers will curl into a fist when talking about negative situations). Fist is then used to represent concepts of "knowledge" and "automation"
C	C	E
classifying roles	multiattachment	the teacher
pcoh-blade-rh		fist-bh
"Because those names imply that <i>there's a good reason</i> for classifying things..."	"this would have a diagram where"	(..) not the teacher consists of <i>the</i> (...) and <i>teach</i> (...) and <i>er</i> ... \
Blade gesture separates space in front of C, as if representing the separated units resulting from classification.	The "measure" shape represents the diagram	Fist seems to be for emphasis on the negative ("not") initially, and then perhaps acts similarly as an emphasis on the wrong composition of the noun phrase constituent.

Appendix II (continued)

IND-INDEX	HAND-INDEX	PINCH
E		E
Core and head of NP		organize structure of sentence
ind-index-rh		pinch-rh
(..) a noun, \ (..) so, / (..) Jill, _ (..) the teacher, / (..) the red book, / (..) the very latest (...) novels, \ Index finger points to the words he is discussing as noun phrases		(..) and that organization structure isn't one of just, / this is next to <i>that</i> is next to <i>that</i> is next to <i>that</i> \ Pinching each word in the sentence, specifying how there is more to the sentence structure than just adjacent words
M		D
rules core periphery		ungrammatical forms to teach
ind-index-rh		pinch-rh
(..) <i>other times the change manages gettin' into the core</i> , /		... Rennot has even suggested that we do that, / to the point that we teach ungrammatical forms, _
Points to the inside of the "core" she was previously making with both hands		The pinch seems to occur on the word "point", and then the rest of the gesture strokes appear rather beat-like
C		C
multiattachment		grammatical relations theory trashcan
ind-index-bh		pinch-lh
it's actually <i>one and two</i> , it's <i>multiattachment</i>		<i>this theory was a very precise list</i>
Draws what look like parentheses(?) with both both hands, signifying the attachment from both sides one after the other on (one) and (two), and on "multiattachment" redraws both multiple times with both hands at once, further emphasizing the closure from both sides		Again we see the word "precise", and the use of the pinch may actually influence or at least predict the use of a word such as "precision". Then uses the pinched shape to draw a line on "list"

Appendix II (continued)

SCRUNCH	PUOH-LATERAL	PUOH-SYM
E	E	C
core and head of NP	the teacher	grammatical relations theory trashcan
scrunch-lh	puoh-lateral-bh	
... Typically however when people talk about a noun phrase, \\ ok? / they're talking about a phrase which has, / at its core, \\ (...) a noun, \\	(...) and that <i>teacher</i> consists of <i>teach</i> and <i>er</i> , \\	Those are traditional ones: subject, verb, object etc. etc.
Scrunch gesture indicates core (noun) of a noun phrase. NOTE: scrunch below has a very representative purposes.	Displaying both parts of teacher with his two open hands, bounces both on "teacher" to signify their unit-like nature, and then each one respectively to show how they can be decomposed	Gesture seems to imply almost an attitude of carelessness/obviousness about these grammatical units (they are typical examples of different parts of speech).
E		M
pre suf in circumfix		growing verbs extensive agreement patterns (Universals)
scrunch-rh	*****I found no other examples of this, it might be best to collapse it into a general group of puoh forms	because you're piling up all those affixes on the ve=rb, / (...) your <i>verb's</i> getting very big, / (...) very (...) lo=ng, / (...) and very informative, \\
... the sides (uhuh) suffixes at the end and the prefixes at the beginning, / that you can find readily in Eng / \ lish, \\ that some languages have infixes, — morphemes that go right into the middle of another morpheme, \\		
Similar to previous, scrunch indicates an entity - in this case a morpheme - treated like an object, and shows its placement in the middle of a greater object.		
		M
		object dropping verb class (Universals)
***** Scrunch seems to be a gesture that predominantly occurs with E; I could find no other examples from the other speakers.		... There are some conditions on this class of, \\ you know, / (...) object dropping verbs, \\ (...) but it's still a very large class... \\
		"Obviousness" attitude is displayed through symmetrical offshoot.

Appendix II (continued)

PCOH-BOX	HORI-TRACE	VERTI-TRACE-lh
D	L	M
chunk (I don't know)	Fillmore semantic roles	head verb-final/initial lg (Universals) veri-trace-bh
pcoh-box-bh		
(...it's a (...) probably a prefab (...) chunk, / right? /	(..) and, / (..) what he said was, _ (..) tho=se are the most important, (..) um, _ (..) ways of understanding grammar, _ (..) in terms of, _ (..) grammatical relations, like subje=ct, _ and predicate and so forth, \	... Sort of like a harmony, _ across categories, \
Formation of box occurs during pause right before "probably", she appears to be holding the chunk in her hands	L traces a horizontal line in reference to grammatical relations (Subject, predicate, etc.), as if representing the length of a sentence in the air.	Dual hand-use might indicate harmony via parallelism; movements by both hands are in sync with each other.
M	M	C
moving groups	s', down (Syntax 3)	grammatical relations theory trashcan
pcoh-box-bh	hori-trace-rh	verti-trace-lh
we check whether, this unit, / this group, / can be, / moved around	(..) plug in the x-bar option, _ (..) which would, / keep it going, _ a=l the way, _ down... \	"This theory was a <i>very</i> precise list."
Again, box seems to be describing a unit, and then on "moved around", M moves both hands in unison as a unit	horizontal movement seems to represent the action of "plugging in"	Emphasis on this gesture seems to be in its representation of precision: vertical line is traced to come down to a definitive point at the bottom.
E	M	E
sentence made up of phrases	tree chunk, top, order branches (Syntax 3)	sentences made up of phrases
pcoh-box-bh	hori-trace-rh	verti-trace-rh
... Sentences, \ (..) while they're made up of words, _ (..) aren't made up of words, \	the right side of the ru=le tells you, / (..) what it branches out to, _ (..) and the order, / in which those bra=nches occur... \	so at some level \ all those things that we could substitute, _ (..) for Diana, \ (...) are equivalent (...) to Diana, \ (..) in that sentence, \ (...) and we can think about those in one sense as, _ (..) substitutable phrases... \
Uses hands to bracket what defines a sentence, and draws hands out slightly seeming to signify that there's more to the issue than just this unit called a sentence	movement along linear horizontal line might indicate linearity in the order of branches.	this seems to be a vertical representation of a sentence, and is unique in that most times sentences are represented as horizontal objects in space.

Appendix II (continued)

DIAG-TRACE	HORI-JOIN	HORI-PART
M node, branches (Syntax 2) diag-trace-lat	M properties of NP inside, top hori-join-bh (..) The= rightmost bra=nch, / goes down to=, _ another, (..) node, / (..) on the tree, \ N-O-D-E, \ which <i>itself</i> branches, _ (..) to invite and Terry... \ Gesture seems to represent the branching limbs of a tree.	Ed Bound morpheme string hori-part-bh (..) and we want, _ all of those <i>properties</i> , _ <i>lumped together</i> , _ in that one noun phrase, \ Hands seem to push the properties together Hands draw away from each other, <i>out</i> to the left and right, to imply the building up of multiple morphemes
M structure, tree, refl. Summary (Syntax 2) diag-trace-rh	E pre suf in circumfix hori-join-bh (..) we need to be able to refer to going up to that, / first dominating no=de, _ (..) branch- branching no=de that dominates the antecedent, / <i>and seeing</i> whether it dominates the reflexive as well, \ Again gesture seems to represent the branching limb of a tree.	D within one structure and compared hori-part-bh (..) <i>but they have to go together</i> , \ Starts with prefix in one hand and suffix in other, and then repeatedly moves them together and out to emphasize how they surround the word Draws hands out in contrast to her saying the word "within", making the negation in the phrase clearer
M tree chunk, top, order branches (Syntax 3) diag-trace-lat	D incorporation of question & answer hori-join-bh (..) and, / the right side of the ru=le tells you, / (..) what it branches out to, _	M String of words II hori-part-bh we <i>think</i> of the sentence as a string of words, _ Gesture joins the question and the answer, as she says "one" to imply the unity of the statement Pulling the string of words out between her hands, making the usual horizontal orientation of a sentence

Appendix II (continued)

PUSH	PULL	SCALE
Ed ling models abstract push-bh and <i>over the course of the last twenty years, / twenty-five years, \ as linguists have pushed more and more their understanding, \</i>	D people participate community pull-bh and language is not something that you <i>get, \ (..) it's not a commo-dity, \ (..) it's not um, \ (..) uhuh something that you acquire and possess, \ (..) it's rather something that you use... \</i>	L Chomsky levels of study scale-rh ... Because what the Bloomfi=edians were doing, \ (..) was going from <i>phoneme, \ (..) to morpheme, \ (..) to immediate constituents, \</i>
Analogizes the extension of boundaries by moving hands outward from his body	Lateral display of hands seems to "hold" language, and then D pulls it toward her body as if she's getting something	Uses scale to indicate levels of constituent analysis, wherein highest vertical point represents the most complex constituent.
D emergent grammar (fist) push-bh ... The idea that, / it's not that you lea=rn a lot of knowledge, \ (..) and <i>then you learn how to apply it \</i>	E step away substitutability pull-bh ... Let's step away from the meaning of XX words (mumbled), \ (..) let's look at substitutability, \ (..) let's go back to what <i>really basic sentences look... \</i>	E organize structure of sentence scale-bh ... the point is that (..) there's an organizational struc / \ ture, \ (..) which <i>operates on lots of different levels, \ (..) and that organization structure isn't one of just, / this is next to that is next to that is next to that \</i>
Shows knowledge as being "in the head" and then applying as the move outward from the body, implying that applications are outside of oneself, in the real world	Seems to be using closeness to the body to signify what is "basic"	Different points touched vertically in the air seem to indicate the different levels of operation.
		D SLA sequence of negation scale-rh
		English as a second language order, \ to see <i>no plus verb, / (..) unanalyzed don't, \ (..) coming in of auxiliary, \ (..) particularly ca=n (..) and be=, \ (..) and finally the analyzed doesn't form, \ (..) that's a very well attested sequence of development... \</i>
		Speaker uses scale representation to show order of auxiliaries/negatives, etc. in syntax: topmost level represents earliest element in order.

Appendix II (continued)

HORI-WAVE	VERT-WAVE	DIAG-WAVE
D	M	
non-linearity	curly embedded clauses (Syntax 3)	
hori-wave-rh	vert-wave-rh	
... You see, / (..) some nonlinearity, _ (..) I'm- I'm assuming, \ (..) right? /	... But, / this is gonna be, / (..) another one, _ with embedded sentences, _ coming in verb phrases, _ all the way down... \ /	No examples, though it is arguable that the vert-wave listed in M's is actually horizontal (I originally had this before I saw Allegra's data)
Directly (consciously?) draws a non-linear graph with her right hand		
E		
organize structure of sentence		
hori-wave-rh		
... the point is that (..) there's an organizational struc / \ ture, \ (..) which operates on lots of different levels, \ (..) and that organization structure isn't one of just, / this is next to that is next to that is next to that \ /		
Draws bouncing curves with his hands while he picks out particular words in his horizontal sentence		
M		
reflexive pronoun moves		
hori-wave-bh		
(..) and you sort of highlight, _ by themselves, / by moving it to the front of the sentence...		
Sweeping, non-linear motion draws attention to the chunk "by themselves", to which she is referring		

Appendix II (continued)

ARCH-TL	UP-CURVE	DN-CURVE
M	M	M
circumfix (Morphology)	category mismatch (Morphology)	travel together
arch-tl-bh	up-curve-rh	
(..) it just sort of ("phih" – sucking noise), / <i>circums</i> the-, / (..) <i>circus</i> –, / (...) encompasses, / them, / the front and back end of the word... /	(...) so=, / the <i>category mismatch</i> , _ (..) explanation, _ (..) isn't gonna work here... \	(..) those words really like to go together, / in fact they like to <i>travel together</i> , _ to the front of the sentence, \
Shows encirclement/surrounding of a word in physical space as an abstract representation of circumfixes.	Similar to C below, this movement seems to indicate a link between two objects in space - in this case, a "mismatch"	right hand traverses under the sentence itself to show the movement of the words from one part of the sentence to the other
M	C	
rules core periphery (Universals)	anaphor	
arch-tl-bh	up-curve-rh	
(..) so the rules–, / the rule governed part, _ is the co=re, \ (..) <i>the periphery</i> is where all the messy stuff happens, _	"It gets its reference... [<i>gesture during pause</i>]... how... It gets its reference to get its reference"	Speaker appears to be the only one using down curves, which she does in at least three clips, though I only described the one in "travel together"
look at this gesture in juxtaposition to previous gesture for "the core"; speaker outlines periphery physically in the air via arches. NOTE found arches only with M, who seems to be more prone to gesturing using curved-movements than the other speakers.	Motion along curve seems to indicate the assignment of reference from referent to reference.	

Appendix II (continued)

CIRCLE	ROTATION	WRIST-ROTA
M	E	D
reiteration, NP terminal level (Syntax 3)	language made up of items recombined	people participate community
circle-rh	rotation-lateral	
(..) that you can have, / sort of, / (..) things, / (..) iterating, _ (..) or recurring, _ (..) indefinitely, _ (..) but you've got to have, _ some (..) terminal level... \	... Language is built up of the same few items, _ (..) <i>recombined</i> (..) and recombined (..) and recombined \ with the larger and larger, / and more and more complex structures. \ (last word is mumbled)	we're trying to understand ho=w, _ people (..) learn to participate, _ (..) in a community, \ (...) grammatically, /
	Rotation of hands around each other compares the recombining of linguistic items to mixing physical objects	The verb "participate" seems to be linked to the motion made by the moving hand.
L	D	D
Lg elements use in context	grammar rules, apply, practice	grammar' is not a thing, dynamic
circle-bh	rotation-lateral	
(..) but it also was, / (..) a social context, \ (..) that is, / (..) the, / (..) the wha-, / the <i>particular</i> , _ (..) <i>instantiation of the use of an</i> <i>element</i> , _ (..) <i>in a given social situation</i> , \ /	then you use them, \ yes? / <i>with practice</i> , / you inculcate them, \ you auto— / you get them and internalize them, \ /	(..) it sees the use (..) and grammar (..) together, \ the grammar coming out of the use,
	The repeated rotations of D's hands around each other on "with practice" seem to be an analogy for repeated use of grammar rules as "practice"	Similar to previous example, the verb "use" seems to be linked to the motion made by the moving hand. NOTE: This gesture seems particular to D. After looking through the data carefully I think this gesture is really confined to her.

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