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Volume 3

Metaphor and Gesture
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Peircean semiotics meets conceptual metaphor Iconic modes in gestural representations of grammar

Irene Mittelberg

This paper approaches the gestural sign from a cognitive-semiotic perspective combining Peircean semiotics (Peirce, 1955, 1960) and conceptual metaphor theory (Gibbs, 1994; Johnson, 1987; Lakoff, 1993; Lakoff & Johnson, 1980, 1999; Müller, 2004; Sweetser, 1990). It suggests that these two theoretical strands share central assumptions regarding image-schematic structures, metaphorical projection, and habitual patterns of experience and interpretation (Danaher, 1998) and that exploring spontaneous co-speech gesture reveals additional points of cross-fertilization. In the gesture modality, embodied structures are re-externalized and visualized.

The corpus for this study consists of videotaped academic discourse and gestures produced by four linguistics professors during introductory courses. Applying Peirce’s taxonomy to gestural representations of grammatical concepts and structures, I demonstrate in what ways his categories of icon, index, symbol, and especially the less widely used sub-categories of iconicity (image, diagram, metaphor) allow to capture both fine distinctions between and transient cases of sign-object relations within a metaphorically accessed domain. Forms of interaction between iconic and indexical modes are also briefly discussed.

1. Introduction

Describing, reasoning, and theorizing about grammatical phenomena are cognitive activities that are central to every linguist, language teacher, and, to a certain extent, to any speaker who engages in some sort of meta-linguistic discourse. The question that motivates the work presented here concerns the ways in which speakers spontaneously draw on multimodal resources to convey abstract knowledge. Of central interest is the role bodily semiotics plays in the teaching of grammar and linguistic theory. Given that conceptual metaphor is assumed to be instrumental in accessing and concretizing abstract domains, one of the underlying assumptions is that figurative thought is at the heart of meaning-making processes

in both speech and manual modalities. In this paper, I demonstrate some of the ways in which the co-speech gestures produced by linguistics professors exploit space to represent grammatical concepts, relations, and structures.

Work on metaphoricity in gesture, particularly done from a cognitive linguistic perspective, has shown that the manual modality can provide additional evidence for conceptual metaphor. That is, gesture has the potential to depict embodied aspects of abstract concepts, such as source domain information of metaphoric mappings not necessarily expressed in concurrent speech (Bouvet, 2001; Calbris, 2003; Cienki, 1998a, 2005; McNeill, 1992; Müller, 1998, in press; Sweetser, 1998, 2007). These observations suggest that investigating manifestations of figurative thought in media other than language can substantiate claims that are primarily made on the basis of traditional linguistic data (e.g., Gibbs, 1994; Gibbs & Steen, 1999; Johnson, 1987; Lakoff & Johnson, 1980, 1999; Lakoff, 1993; Sweetser, 1990, 1992). In the light of the well-established claim that metaphoric mappings are conceptual and thus “non-propositional” (Johnson, 1992, p. 349), they appear to condition externalizations of mental models in multiple modalities, with each semiotic mode having its characteristic affordances and limitations (e.g., Forcleville, 2005; Kress et al., 2001; Mittelberg, 2002; Müller, in press; Tilley, 1999; Whittock, 1995). Exploring bodily communication appears to be a natural endeavor to gain insights into situated aspects of cognition and knowledge mediation, particularly regarding the centrality of embodiment in cognitive linguistics (Gibbs, 2003; Lakoff & Johnson, 1999; Lakoff & Núñez, 2000; Núñez, 2004; Núñez & Sweetser, 2005; Smith, 2003; Williams, 2004).

Building on this body of interdisciplinary research, this paper explores the semiotic work gestures perform in visualizing abstract concepts and structures. It reports on one part of a larger study on both metaphor and metonymy in meta-grammatical discourse (Mittelberg, 2006). Of particular interest here are the different types of iconic modes that I was able to discern in gestural representations of the metaphorically conceptualized domain of grammar. Central to this work is, nonetheless, the finding that while conceptual metaphor is central to accessing abstract domains, conceptual metonymy, as the second major figure of thought, assumes an equally prominent role not only in terms of sign formation via synecdoche (Bouvet, 2001; Müller, 1998), but also in terms of contiguity relations between gesturing hands and the metaphorically construed, imaginary objects they may hold or otherwise manipulate (Mittelberg, 2005, 2006; Mittelberg & Waugh, forthcoming).¹

1. For additional indications that metonymy partakes in the semiotics of gesture and signed languages see Bouvet (1997, 2001), Wilcox & Morford (2007), Müller (1998), Taub (2001), and P. Wilcox (2004).

The focus of analysis is on what Müller (1998, pp. 110–113) calls in her functionalist typology of gestures “referential gestures”; “performative gestures” and “discursive gestures” will not be taken into account here. Referential gestures are defined as depicting objects, attributes of objects or people, actions, behaviors, etc. Depending on the specific nature of the referent of the gestural sign, Müller further distinguishes referential gestures that represent concrete entities from those that represent abstract entities (see also Calbris, 2003 and Cienki, 2005).

The approach to multimodal metaphor taken here combines a functionalist-cognitivist perspective with Charles Sanders Peirce’s pragmaticist semiotics (Peirce, 1955, 1960). The rationale for combining these frameworks integrates the following three aspects: first, some of the categories widely used in gesture research are based on Peirce’s semiotics (McNeill, 1992, 2005). Second, cognitive metaphor theory and Peirce’s semiotic have been shown to share central assumptions about the link between image-schematic conceptual structures, metaphorical projection, and habitual patterns of experience and interpretation (Danaher, 1998; Hiraga, 1994). And third, Peirce’s notions of *icon*, *index*, and *symbol* as well as the different sub-types of icons he posited (*image*, *diagram* and *metaphor*) still need to be applied to gesture more systematically. Although the scope of this paper only permits the discussion of a few examples, the aim is to demonstrate some of the ways in which working with Peirce’s modes of representation, and particularly with his less widely used sub-categories of object-sign relationships, provides a way to capture both fine distinctions and transient cases regarding the different types of cognitive-semiotic relations. Notably, I will argue that the different iconic modes (*image iconicity*, *diagrammatic iconicity*, and *metaphor iconicity*) may interact in gestural representations of grammatical phenomena, motivating not only the link between gestural signs and denoted concepts, but also regarding the relations holding between single gestural signs that depict, for instance, linguistic units within a larger morphological or syntactic structure.²

Iconicity has been identified as one of the central semiotic modes underlying gestural representations of both concrete and abstract objects and actions. In McNeill’s (1992, p. 14) original gesture classification system, gestures depicting concrete entities are called *iconics*, and gestures representing abstract entities are called *metaphorics*. It should be stressed right away that these gesture categories are not mutually exclusive and that metaphoric gestures may comprise layers of several semiotic

2. As discussed in detail in Mittelberg (2006) and Mittelberg & Waugh (forthcoming), Peirce’s distinction also correlates with Jakobson’s view of similarity (i.e., icon/metaphor) and contiguity (i.e., index/metonymy) as two fundamental cognitive strategies that have the potential to structure both verbal and non-verbal messages (Jakobson, 1956; Waugh, 1992; Waugh et al., 2004).

modes.³ McNeill and other gesture researchers have shown that metaphoric gestures tend to be at their base iconic in depicting aspects of the concrete source domain of the underlying metaphorical mapping (Bouvet, 2001; Cienki, 1998a, 2005; Parrill & Sweetser, 2004; McNeill, 1992, 2005; Müller, 1998, *in press*; Sweetser, 1998, 2007; Taub, 2001). Nonetheless, as we will see, a metaphorically motivated gesture does not necessarily represent the source domain iconically; a small imaginary object inside of a closed fist, for instance, first needs to be metonymically inferred before it can be interpreted as a metaphor for a small linguistic unit such as a grammatical morpheme (Mittelberg, 2005, 2006; Mittelberg & Waugh, *forthcoming*).⁴

Given the frequently observed mixing of semiotic properties in one and the same gesture, McNeill (2005, p. 41) recently proposed disregarding categorical systems for the classification of gestures and to speak instead of "dimensions" such as iconicity, metaphoricity, etc. Indeed, one and the same gesture, for example a gesture consisting of a hand tracing the outline of a sort of "base in the air," may potentially refer to either a concrete or an abstract entity. Whether such a gesture depicts something concrete, such as the foundation of a building, or something abstract, such as the foundation of a theory, can only be determined in correlation with the concurrent speech content. If the speaker refers linguistically to the foundation of a building, the gesture receives a concrete interpretation. Conversely, a linguistically expressed figurative understanding, referring to the foundation of a theory, will evoke a metaphorical interpretation of the same gesture. From a cognitivist perspective, the conceptual metaphor THEORIES ARE BUILDINGS (Grady, 1997; Lakoff & Johnson, 1980) may be said to motivate such a multimodal rendition of an abstract idea. In referring to an abstract notion, a metaphoric gesture may also rely on metonymic principles of sign formation (e.g. via synecdoche) in that the hands depict the locally essential elements of the object or action in question, e.g., the base line of a building described above (Bouvet, 2001; Mittelberg, 2006; Müller, 1998). It can further fulfill distinct discourse-pragmatic functions such as demarking a chunk of space for subsequent use, directing the addressees' attention, etc. (Müller, 1998, p. 113).

Ascribing considerable weight to the noted multidimensionality of gestural signs goes hand in hand with Peirce's view that the different semiotic modes at work in a given process of signification may overlap to various degrees. Accordingly,

3. I wish to thank Susan Duncan, discussant of the panel "Metaphor and Gesture" at the 2003 ICLC in Logroño, for an insightful discussion regarding the issue that gesture categories are not mutually exclusive and that metaphorics may be parasitic on other modes.

4. Taub's (2001) work on American Sign Language has shed new light on embodied cognitive structures and on the ways in which iconicity interacts with metaphor (with relevance to co-speech gesture and spoken language). Bouvet (2001) demonstrates ways in which gestural signs may be predominantly metaphorically or metonymically motivated.

the larger part of this paper is devoted not only to the characterization of the different sign-object relationships put forward by Peirce, but also to the interaction of semiotic modes within referential gestures of the abstract. In what follows, I first describe the corpus and methods developed for this study (section 2). I then illustrate Peirce's basic notions of *icon*, *index*, and *symbol* and his sub-divisions of the icon with examples from the data (section 3). Finally, I trace some common ground between Peircean semiotics and cognitive metaphor theory, particularly in terms of image schemas and their metaphorical extensions (section 4), and offer some concluding remarks regarding bi-directional processes of abstraction and concretization via the human body (section 5).

2. Data and methodology

There exists to date no unified empirical methodology for gesture coding and analysis; the approach developed for this study thus represents only one way of transcribing, coding, and analyzing spontaneous co-speech gesture.⁵ Since this paper serves as one part of a larger study of iconic, metaphoric, and metonymic modes in multimodal representations of grammar (Mittelberg, 2006), I will only describe those parts of the analytical apparatus that are directly relevant for the issues of interest here. The emphasis will be on the prominent hand shapes and movement patterns that emerged from the data and build the material basis for the different iconic modes of sign-object relationships to be demonstrated throughout the paper. Aspects of how the detected schematic images of objects and actions may build the basis for metaphorical projection will be discussed in sections 3 and 4.

2.1 Data

The corpus designed for 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). The subjects were videotaped while lecturing in introductory linguistics courses at two major American universities. The focus of attention is on the communicative behavior of the teacher lecturing; student behavior and teacher-student interaction are not considered here. Compared to genres such as narrative and conversation, these classroom lectures consist of expository discourse, and although the teachers do at times reach out to

5. For a concise overview of the field see Kendon (1997), for more comprehensive accounts see McNeill (1992, 2000), Müller (1998), and the recently published monographs by Beattie (2003), Goldin-Meadow (2003), Kendon (2004), and McNeill (2005).

the audience and interact with students to solicit feedback and answer questions, the nature of the speech is monologic rather than dialogic. Base-level courses seemed to be suitable for this kind of research, 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 general grammatical issues (such as morphology, syntax, and phonology) as well as different theoretical views of grammar and linguistic theory: generative grammar, emergent grammar (in the context of second language acquisition), and relational grammar. In teaching contexts, speakers usually move about the classroom, write on and point to blackboards, whiteboards, overhead transparencies and screens, interact with the audience by turning and/or walking towards students asking questions, and so forth. Obviously, factors such as the physical environment, the locations of the speaker vis-à-vis the student audience, and the use of artifacts determined how the video camera was set up to ensure that all of the physical elements and the speakers' movements were captured as completely as possible. The video camera was mounted on a tripod and placed in the back of the classroom. Each lesson was videotaped in its entirety.

2.2 Methodology

The corpus was assessed from a conceptual point of view, selecting and capturing episodes in which referential gestures depicting grammatical phenomena occurred. The goal was to determine how speakers linguistically and gesturally represented linguistic units (morphemes, words, phrases, etc.), grammatical categories (verb classes, cases, semantic roles, etc.), syntactic structures (clauses, sentences, etc.), as well as operations (active-passive transformation, subordination, reiteration, etc.).

The speech of each segment was transcribed by adapting the discourse transcription convention provided by Du Bois and colleagues (Du Bois et al., 1993) to the level of detail deemed appropriate for this study. The next step was to code the gestures, thereby accounting for the exact mechanics of speech-gesture synchrony, which entailed documenting systematically and in relation to the concurrent speech the form and dynamics of the manual configurations and actions unfolding in space and time.⁶ The course of each gestural movement (e.g., onset, peak, hold,

6. Gesture researchers 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, pp. 144–154; Kendon, 2004; McNeill, 1992, 2005; Müller, 1998, pp. 175–199, 284ff.; Parrill & Sweetser, 2004; *inter alia*). This study has particularly been inspired by the methods of transcription, coding, and analysis developed by the McNeill Lab (McNeill, 1992, 2005), Müller (1998, 2004) and Webb (1996). For more detail see Mittelberg (2007).

return to rest, etc.) was translated into typographic representations, superimposed on the written speech transcript. Each gesture was traced from the moment the articulators (here hands and arms) begin to depart from a position of rest or relaxation until the moment when they return to rest, thus accounting for what Kendon (2004, p. 111) calls such a "gesture unit." Only gestures articulated with hands and arms were taken into account, leaving aside facial expressions, gaze, instances of self-grooming, and movements of the head and torso.

To capture the kinesic features of gestures, the most widely used coding parameters are *hand presence* and *hand dominance* (left hand and/or right hand), *hand shape*, *palm orientation*, *movement* (trajectory and type), and the *location* in gesture space where a gesture is performed (McNeill, 1992, 2005; Kendon, 2004; Webb, 1996; *inter alia*). This array of physical gesture features was also used for this study. For each holistic gestural gestalt and in correlation with the speech content, those features that contributed most significantly to its meaning and function were identified. In certain cases, the movement proves to be more salient with respect to the meaning of a gesture than 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., in the case of a precision grip gesture), and in yet other cases, both dimensions are significant (e.g., a push with both hands flat and palms facing the addressee, thus building a barrier and evoking the idea of 'stop' or 'rejection').

2.2.1 Hand shape and palm orientation

Opting for a data-driven typology of manual signs, the data were searched for recurring hand shapes and movement patterns across contexts and speakers. Then labels were assigned to each of the prominent forms. For example, one of the most frequently used hand shapes in the data is a flat open hand with the palm turned upwards. Here it seemed worthwhile to build on conventions introduced by Müller (2004) in her study of forms and functions of the palm-up open-hand gesture (hereafter referred to as "puoh"). Each variant of the open hand gesture that occurred in the data was given a similar abbreviation, indicating the orientation of the palm, plus a short name evoking the degree of openness of the hand ("tray," "cup," "lid," etc.) as well as an indication of which hand performed the gesture. For instance, "puoh-tray-lh" stands for a flat palm-up open hand, produced with the left hand, evoking the shape of a tray. Or, "pvoh-box-bh" stands for another frequently produced gesture consisting of two hands held apart, with both palms being held vertically and facing each other, as if they were holding an object between them.

2.2.2 Movement and location in gesture space

Gestures typically involve some sort of movement through space. Describing the manual actions entailed accounting for the range and trajectory of the performed motion (for example, along horizontal, vertical, or diagonal axes) as well as the manner of the movement (straight line, wave, rotation, etc.). Instances in which a movement is discontinued or a configuration is being held (i.e., gesture holds) were also recorded. The movements observed in the present data constitute several kinds: first, hands tracing links between two or more locations in gesture space; second, pointing gestures whose direction and range depend on the location of the object or person being pointed at; and third, genuine motor actions such as the rotation of the wrist or a sweep performed with hand and forearm. In keeping with the notational conventions used for hand shapes, the prominent movement patterns observed in the data were given labels. For example, "vert-trace-rh" signifies a line that is traced vertically with the right hand, and "wrist-rota-lh" refers to a wrist rotation performed with the left hand.

Gestures evolve and vanish in space. Gesture space is relative to, and constituted by, the position and posture of the speaker-gesturer who, in each communicative situation, sets up the coordinates of gesture space around her, according to the dimensions and movements of her body, the range of her gestural articulators, her physical environment, and, if applicable, also according to the interpersonal space spanning between herself and her interlocutor(s). 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.

I will now introduce those parts of the interpretative framework that are relevant in the context of this paper. First, I illustrate Peirce's modes of representation with examples from the data, and second, I draw connections between the different modes of iconicity (*image, diagram, metaphor*) on the one hand and image schemas and conceptual metaphor on the other.

3. Peircean perspectives on the gestural sign

Peirce's widely-applicable pragmatist theory, with its dynamic understanding of the sign, is particularly valuable in gesture research (cf. Enfield, 2003; Fricke, 2004; Haviland, 2000; McNeill, 1992, 2005). According to Peirce, "we think only in signs" (Peirce, 1960, p. 169, 2.302). Gestures are undoubtedly part of the semiotic landscape, and particularly part of the bodily semiotics, on which we draw to make meaning and also to make sense of what others try to convey. This is particularly true regarding knowledge mediation and social interaction in teaching contexts.

As I hope to show in the course of this paper, exploring what Peirce understood by *similarity* and *contiguity* relations in co-speech gesture can account for a wide range of meaning-making processes in the data. Focusing here on similarity relations, the considerations below are also meant to prepare the ground for the ensuing discussion (section 4) of how investigating gesture from this angle may reveal instances in which Peirce's semiotics and cognitive metaphor theory can cross-fertilize each other (Danaher, 1998).

3.1 Peirce's triadic model of the sign process

Peirce's triadic model of the sign includes a *representamen* (the material form the sign takes), an *object* to which the sign refers, as well as the sense that a sign evokes in the mind of its receiver. 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). Signs point to something outside of themselves and they need an interpretive mind to unfold their meaning: "[a] sign not only represents an object but it does so for, and determines, an interpretant (interpretation), the third moment of the sign-object-interpretant process" (Waugh et al., 2004, p. 42). The interpretant, in turn, gives rise to other signs, thus propelling the semiotic process: a limitless circulation and interpretation of signs that derive their meanings 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, p. 33). The following quote encapsulates Peirce's sign model:⁷

A sign [...] 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, p. 135, 2.228)

The part of this model that is not easy to seize is the *ground* of the representamen; it consists of those qualities of a representamen that actually act as a sign in a specific event of interpretation. It represents the signifying properties of the sign vehicle, whereas other properties might be irrelevant in a given context 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 voice

⁷. When referring to Peirce's original writings, I will indicate both the page on which the respective passage appears and the number of the exact paragraph; for example, "Peirce, 1960, p. 135, 2.228" refers to the *Collected Papers*, p. 135, paragraph 2.228.

qualities of 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). Similarly, not all the components of a given gesture contribute to its meaning. Peirce established three different trichotomies of the sign (Peirce, 1955, p. 7), one for each of the three elements outlined above: the sign itself, the sign in relation to its object, and the sign in relation to its interpretant. The discussion below will focus on the second triad and its implications for possible relations between gestural signs and their objects. In this way, the perspective taken is that of the interpreting subject (i.e., the perspective of the student addressee which is also that of the gesture analyzer).⁸

3.2 Interpreting sign-object relationships: Icon, index, and symbol

The triad *icon*, *index*, *symbol* reflects the different ways in which the sign vehicle (i.e., the ground of the representamen) represents the signified object: through *similarity* (*icon*), through *contiguity* (*index*), and/or through *conventionality* (*symbol*). As stated above, there are in principle no pure icons, indices, or symbols; a sign can simultaneously incorporate qualities of all three modes. These sign-object relationships are to be understood as semiotic modes that may layer in a particular process of signification, with the overriding factors determining the local function of the sign (Chandler, 2002, p. 43). 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, p. 21). Anything can be an object, as long as it is represented by a sign (Shapiro, 1983, p. 25). In what follows, I will discuss each of these modes and provide examples from the gesture data.

3.2.1 *Icon*

Generally, in an icon, the relation between the ground of the sign and the object it represents is based on some sort of conceived *similarity*: the signifier is taken to resemble the signified, whether in terms of sound, shape, feel, taste, organization, or some other quality. In Peirce's own words, "Icons have qualities which 'resemble' those of the objects they represent, and they 'excite analogous sensations in the mind' [Peirce, 1960, p. 157, 2.276]" (Chandler, 2002, p. 39). Examples include photographs, painted portraits, and onomatopoeia in language (Jakobson & Waugh, 1979, 2002). The physical form the sign takes is thus to some degree conditioned by the object or action to which it refers. However, even photographs only resemble

what they represent in some respects; they reduce, for example, three-dimensionality to two-dimensionality. No matter how truthfully such highly iconic signs represent reality, they always involve some kind of cultural convention in their production and interpretation (Chandler, 2002, p. 40; Kress & van Leeuwen, 1996). What seems to be vital is the recognizable analogy between real world objects or events on the one hand and the products of their semiotic transformation on the other.

In a similar fashion, the form of an iconic gestural sign is conditioned by the object or action it refers to (cf. *iconics* in McNeill's [1992] typology). A literal interpretation of a referential gesture, such as the one representing the foundation of a building mentioned above, is based on a perceived similarity with a building base structure in the real world. Other examples would be a hand movement that traces the outline of a table by evoking its length and height, or a gesture imitating the action of locking a door using an imaginary key. Such schematic depictions obviously resemble the things and actions they represent only in some pertinent respects, giving sufficient information for the interpreter to metonymically infer, in conjunction with the speech content, their meaning and function (Eco, as quoted in Bouvet [1997, p. 17], calls this the "code of recognition;" see also Müller, 1998).⁹

Let us consider an example from the data. If we looked at the gesture given below (figure 1) with the speech suppressed, how would we interpret it? It does not take much to detect a similarity between this gesture, consisting of two open hands with palms held vertically and facing each other, and the common action of holding a medium-size object between one's hands. However, we might ask whether the object itself gets referred to or rather the action of holding or carrying something. It might be a trivial observation, but in order to evoke the idea of a physical object it is not necessary to trace each of its sides or its exact dimensions. The shape and constellation of the hands indirectly allude to the two outer sides by which the imaginary object, occupying the space between them, is seized. The mind may fill the empty space between the hands with a three-dimensional solid object. By ignoring the speech content, one can entertain such speculations about the iconic properties of a gesture; however, the concurrent linguistic elements disambiguate such polysemous gestural signs instantly.

8. For a discussion of the remaining two triads, the different types of objects and interpretants, and the role of abduction see Mittelberg (2006).

9. Here, in fact, iconicity and synecdoche interact, playing into the gestural sign formation by abstracting essential parts of objects which then get to stand in for the entire referent; see Müller's (1998) modes of gestural representation and Mittelberg's (2006) taxonomy of metonymic modes, with synecdoche being one of them.

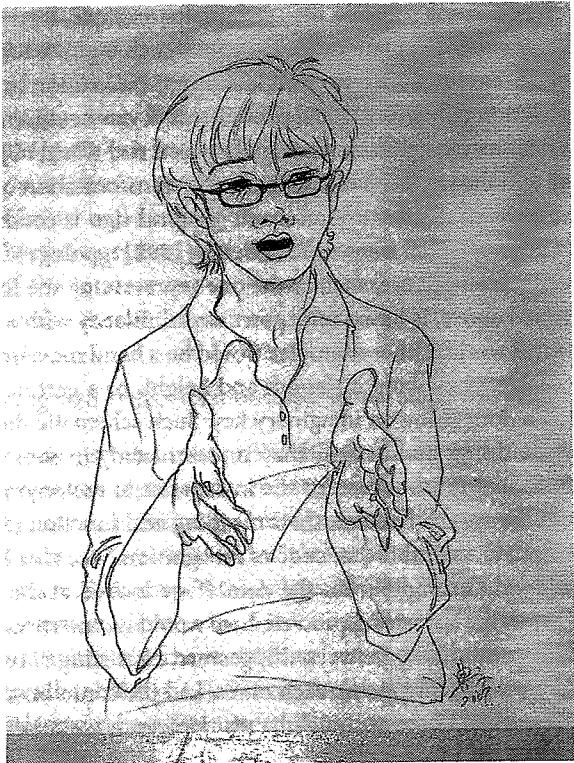


Figure 1. "Grammar" as an object

Evidently, the gesture shown above may iconically depict a physical object such as a box and/or the action of holding such a box; or, it may also, through a metaphorical interpretation, refer to an abstract entity. As the transcript below reveals (example 1), the speaker refers here to the concept of grammar:¹⁰

- (1) ((grammar is not a thing))
... maybe a too radical departure for you from the normal way of looking
at how grammar is acquired

^{10.} The abbreviations used in the transcript follow the conventions introduced in section 2 (inspired by Müller, 2004: "pvol" stands for "palms vertical open hand," "bh" stands for "both hands," and "rota-bh" for both hands rotating around one another). As for gesture-speech synchrony, the speech segments that coincide with a gesture are set off by square brackets, speech segments highlighted in bold face represent the gesture stroke, and underlined speech segments indicate a post-stroke gesture hold.

G1	G2
object-box held between bh	fists-bh
but it does not see [grammar as a thing] [that you get] /	
G3	
rotation-bh	
[.. and then u=se]	

Gesture 1 (G1) expresses the idea that grammar should not be understood as a thing, i.e., as a commodity that one can "get" and hold on to (G2: each hand forms a closed fist) for subsequent "use." The action performed in gesture 3 – two hands rotating around one another – conveys the idea of an ongoing activity, here probably referring to cognitive processing, or the act of practicing language skills.

In fact, Figure 1 illustrates a typical instance of a gesture frequently found in the data, with varying distances between the two hands, representing words, constituents, sentences, or entire discourses respectively. What such renditions have in common is that they reify abstract ideas in the form of graspable entities or bounded space. Seen from a cognitive linguistic perspective, these gestures are manifestations of the conceptual image schemas OBJECT OR CONTAINER and reflect the metaphorical concepts IDEAS ARE OBJECTS OR CATEGORIES ARE CONTAINERS (Johnson, 1987; Lakoff, 1993; Lakoff & Johnson, 1980, 1999). One should keep in mind that the array of potential meanings (*interpretants*) of this kind of gesture can cut across different domains of experience, and in order to determine whether a given gestural sign refers to a concrete or to an abstract phenomenon we need the support of the linguistic and often also extra-linguistic context.

Articulated in Peircean terms, the gestures discussed above possess a heavily iconic base. As most of the meta-grammatical gestures under investigation here refer to abstract phenomena, they are essentially metaphorical in nature. They evoke, according to Peirce (1960, p. 157, 2.277), a parallelism between the abstract (ideas and structures) and the concrete and the embodied (manual signs), and may exhibit, as I will illustrate in detail in section 3.3, various combinations of iconic modes.

3.2.2 Index

In indexical signs, the relation between sign and object is based on *contiguity*, that is, on a factual (physical or causal) connection between the two. "An *Index* is a sign which refers to the Object that it denotes by virtue of being really affected by that object" (Peirce, 1960, p. 143, 2.248). Smoke indicates fire, a footprint the passing of an animal, a bodily symptom such as pain the malfunctioning of an organ, etc. In language, the use of deictic expressions, or shifters (Jakobson, 1957) – 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 (if the latter is physically present):

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, p. 14)

Indexical gestures fulfill similar functions; the spatial orientation of pointing gestures (*deictics*, in McNeill's [1992] terms), for example, depends each time on the location of the object they are directed towards. Through the act of pointing at something in the proximity of the speaker, for instance on the mention of a demonstrative pronoun, the object is established via a visible vector. Deictic gestures bring to light spatial relationships between speakers and objects, locations, or people, whether they are present in the environment, imagined, or previously introduced in the unfolding discourse (cf. Fricke, 2002, 2007; Furuyama, 2001; McNeill et al., 1993). As naturally contiguous the connection between index and referent may be, pointing practices are also culturally determined and thus to some degree conventionalized (cf. Clark, 2003; Haviland, 2000; Kita, 2003).

To illustrate and anchor their explanations, teachers frequently point to information presented on blackboards, whiteboards, or overhead screens. An example of this proto-typical kind of pointing gesture is given below (Figure 2). Interestingly, for a moment the speaker is using both hands simultaneously, though each is engaged in a different type of semiotic act: he points with his right hand to words projected onto the overhead screen behind him (G4 on the mention of “there is”), while he produces with the left hand a cupped palm-up open hand gesture (G5 on the mention of “the main verb”).

- (2) ((*there is the main verb*))
 - G4
rh-index pointing at overhead
[... but *there is (...)*]
 - G5
puoh-cup-lh held toward audience
*what's [called the main verb]. *

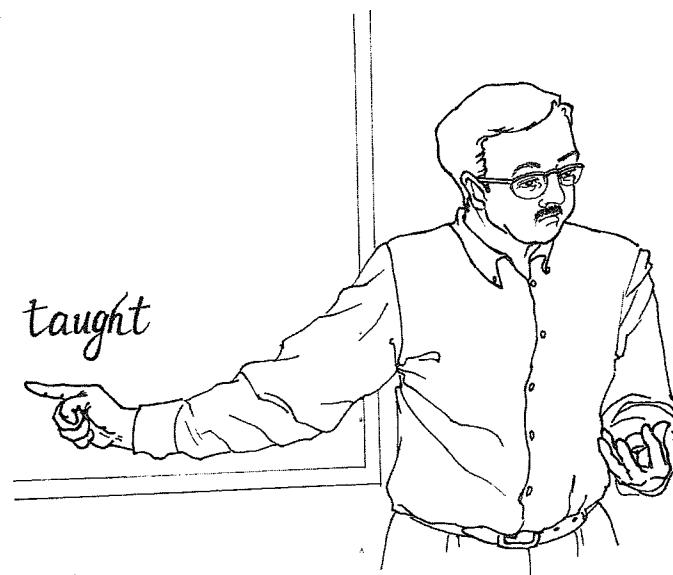
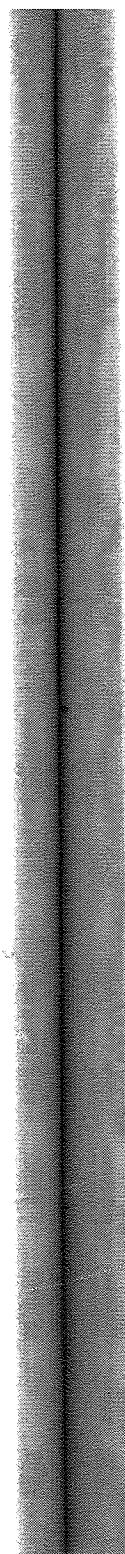


Figure 2. Pointing gesture (“there is”) plus cup gesture (“the main verb”)

An example of the category “main verb” (“taught”) is being pointed at on the screen (concrete deixis), and the abstract category as such is to be imagined as being contained in the cupped hand directed toward the student audience. The second gesture (G5) again reflects a metaphorical understanding of an abstract notion as a concrete object; this object is, however, not represented iconically, but needs to be metonymically inferred as sitting inside of the cupped hand. Put differently, the hand here serves as an index, or a “référence point” (Langacker, 1993), thus providing cognitive access to the metaphorically construed object (see Mittelberg, 2005, 2006, and Mittelberg & Waugh, forthcoming).

Besides these gestural signs with specific deictic functions, gestures can be said to be inherently indexical. They are always contextualized and indexical of the object they represent. They point to something other than themselves. Being existentially tied to the speaker's body, the message, and the context, referential gestures may provide grounding for both concrete elements and abstract ideas in the here and now of the speech event.

3.2.3. Symbol

The object-sign relationship in symbolic signs is primarily based on conventionality. Yet they can also incorporate iconic dimensions, as is the case with onomatopoeic

words and a great number of sign language signs (Taub, 2001; P. Wilcox, 2000; S. Wilcox, 2004). In Peirce's terms, "[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, p. 2.249). Language is the symbolic system par excellence, yet symbolic relationships are to be found in many other sign systems (e.g., religious iconology in paintings, symbolic elements in rituals, etc.), and without the knowledge of the respective code, it is impossible to grasp the symbolic properties of such signs. In addition to socio-cultural and scientific conventions of a law-like nature, there may also exist a habitual link between object and sign which can be fostered over time. The relationship between representamen and object may thus become subject to dynamic change (Chandler, 2002, p. 44). Signs may shift in mode over time; possible factors that bring about such shifts include cognitive and social forces, semantic change, metaphorization, theory building, habituation through learning, and so forth.¹¹

Among the different types of gestures, the truly symbolic signs are codified emblematic gestures (*emblems* according to McNeill, 1992).¹² An example would be the thumbs-up gesture indicating "OK" or "great." As each culture and sub-culture has its own idiosyncratic inventory of emblems, they cannot be deciphered without the specific cultural knowledge. The interpretation of the same emblematic gesture may, in fact, differ across cultures (Kendon, 2004; Morris et al., 1979; Müller & Posner, 2004). Contrary to emblems, most spontaneously produced gestures cannot said to be, in strictly Peircean terms, inherently and predominantly symbolic. Nonetheless, here, too, a gradual habituation due to recurring gesture-meaning pairings in specific environments can result in an increased degree of symbolization and eventually in a new repertoire of conventionalized, i.e., symbolic forms (see Kress et al., 2001; LeBaron & Streeck, 2000; Ochs et al., 1996; Roth, 2003).

11. 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, p. 44).

12. 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, p. 17).



Figure 3. Ring gesture referring to a "node" in the tree structure

As the scope of this paper does not allow the discussion of the intricate processes of habituation taking place in the linguistics classroom, I will instead provide a gesture which only occurs once in the corpus and does not function here as a codified emblem. It is known, however, as an emblematic gesture in several cultures (Kendon, 2004; Müller, 1998). The meanings of this kind of ring gesture, achieved by pressing the tips of thumb and index finger together, include the ideas of precision and perfection. Above (Figure 3), it instead represents a spontaneous attempt to depict a technical term used in the framework of generative grammar, namely the concept of the "node" (G6) designating joints in syntactic tree structures. Both "tree" and "node" are metaphorical understandings of abstract structures (the instructor here analyses a verb phrase consisting of the verb 'invite' and its complement 'Terry'):

- (3) ((node, branching))
 - ... The rightmost bra=nch, /
 - goes down to= another, _
 - G6
 - ring-lh
 - [(..) node, /
 - (..) on the tree, \
 - N-O-D-E,]\

which *itself* branches, –
 (..) to ‘invite’ and ‘Terry’ \

After having exemplified the principal modes of sign-object relationships in Peirce's theory, I will now turn to the three-fold subdivision of the icon.

3.3 Iconic modes within metaphor

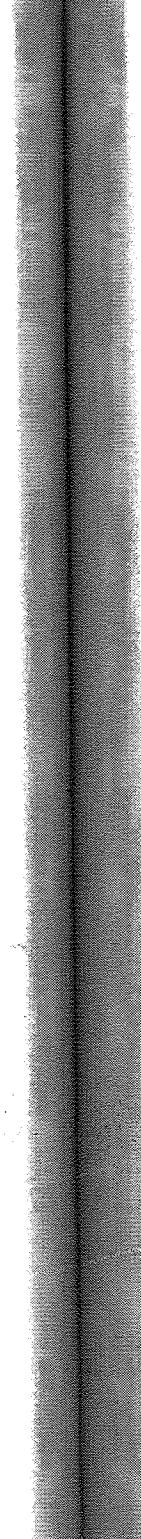
Gestural signs and the objects they represent can be similar in various ways. Iconic gestures, portraying individual objects and actions, are to a high degree *image icons* and belong as such to one of the three iconic modes of representation: *image*, *diagram*, *metaphor* (Peirce, 1955, p. 10). *Diagrams* are icons of relations, schematically depicting the relationship holding between two or more things. *Metaphors* draw attention to similarities between two concepts, thus highlighting a parallelism. In Peirce's own words:

Those [icons] which partake of simple qualities [...] 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*. (1960, p. 157, 2.277)

The goal in this section of the paper is to demonstrate some of the ways in which gestural representations of grammar may combine these different types of iconicity.

3.3.1 *Image iconicity*

A prototypical example of an image icon in the data is the gesture shown above in Figure 1. This gesture consists of two open hands with palms facing each other, appearing to hold a physical object between them. The way the hands are being held evokes the two shorter sides of an object, or, we can also perceive a similarity in relation to the action of holding a generic object such as a box between two hands. As was the case in the first example (“grammar is not a thing,” section 3.2), this kind of iconic sign receives a metaphorical interpretation in the context of meta-grammatical discourse. The point here is that the way in which the object represents a single abstract idea, such as grammar, is an example of *image iconicity within metaphor*. To examine these phenomena further, let us look at example 4 below; the “passive flip-flop” entails the image-iconic portrayal of both an abstract action and an abstract object.



- (4) ((*flip-flop passive*))
 G7
 both arms crossing over chest
 [The passive basically flipflops –
 G7
 being held
the subject and object of the sentence, \
a=nd \
 G7 still being held
(...) what we find out by forming this particular passive], –
 G8
 pcoh-box-bh – held, hands move up and down
 is [that the string ‘John’s sister’ forms a constituent, \
 G8
 still being held hands, move up and down
namely the object of the verb, \
 G8
 still being held, move up and down, hands retract to fist
(..) and that’s an object noun phrase] in fact. \

To illustrate the concept “passive,” the speaker crosses over her forearms (G7, after first holding them vertically and shoulder-width apart). This physical action represents, ironically, the switching around 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 entailed in the syntactic operation of active-passive transformation (according to the generative grammar framework). Following the stroke of the first gesture (G7), which coincides with the mention of the verb “flipflops,” the arms-crossed gesture is being held while the speaker continues to explain the syntactic operation involved (the underline indicates the duration of the gesture hold). She turns her torso leftward towards the overhead screen behind her, walks briefly towards the screen, then turns back and finally faces the audience again. Subsequently, her arms open up again and flow right into the next gesture (G8): both open hands being held more than shoulder width apart and facing each other, seemingly holding an (imaginary) object. Figure 4 below shows both the arms-crossing gesture in its fully executed state and the ensuing object gesture.



Figure 4. arms-crossing gesture (passive “flip-flop”) resulting in large object gesture (“constituent”)

The second gesture (G8) is thus another example of the object gesture reflecting a parallelism between an abstract notion, here “constituent,” and a physical object. As already pointed out, it reflects the metaphorical concept IDEAS ARE OBJECTS (Lakoff & Johnson, 1980), materialized in the manual modality. Upon close investigation, we can, in fact, detect a metaphor incongruity between speech and gesture: Although the sequence “John’s sister” is linguistically described as a string, the concurrent gesture clearly depicts a relatively large box-like object (G8). In the corpus, variants of this image-iconic gesture were found to depict linguistic units of different complexity above the morphemic level (e.g., categories, words, phrases, sentences, discourses, etc.).

3.3.2 Diagrammatic iconicity

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, p. 37). Hence the similarity expressed does not need to be based on a physical correspondence between the object and the sign (as in a painted portrait), but can instead reside in the organizational analogy of the spatial or temporal constellation of at least two parts of an object. Maps, statistical graphs, timelines, musical scores, or family trees may serve as examples of visual schematic representations, all of which also rely on conventions (Chandler, 2002, pp. 39–43; Jakobson, 1966, pp. 409f.). Moreover, diagrammatic iconicity provides structural threads

through complex linguistic signs constructed of individual parts, be they words (Bybee, 1985; Waugh, 1992), sentences (Givón, 1985; Haiman, 1985; Jakobson, 1963), or entire discourses (Waugh et al., 2004).

Diagrammatic qualities in iconic signs are of particular relevance for the present study, because a large portion of the gestures illustrate linguistic structure and in doing so make abstract, relational iconicity graspable by depicting morphological and syntactic structure in a spatial way (in this case, the respective position of each element in space carries meaning). The architecture underlying a sentence is, following Peirce, in and of itself an icon of relations. Within the abstract domain of grammar, I identified several types of *diagrammatic iconicity within metaphor*, two of which I will treat here: first, gesture diagrams that may be created on the fly, and second, gesture diagrams imitating conventional diagrams that already exist in another visual modality (such as tree diagrams or diagrams used in the theory of relational grammar, reminiscent of umbrellas or igloos). An example of the first type, an ad hoc diagrammatic representation of sentence structure, is a hand movement indicating the spatial relationship of linguistic units within a sentence by simply tracing the horizontal alignment of words from the left to the right of the speaker. A slight variation is shown in figure 5 below, where the gesture starts out with both hands joined at the center of gesture space⁴, right in front of the upper torso of the speaker. Then the hands move laterally outward until both arms are fully extended, as if they were tracing a horizontal string or chain of words:

(5) ((string of words))

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

G9

string-bh, lateral horizontal outward movement
So [we think of a sentence as a string of words ...]

G10

sketchy pvh-object-bh, repeated along the string
it's [obvious that we can group the words together in various ways].

After setting up the sentence structure in gesture space (G9), the speaker seems to group elements with both hands (palms facing each other), indicating boundary-like contours of objects in a rather vague way along the imaginary string. The designated spaces between both hands seem to overlap as the hands move from the middle to the right. It is very likely that this kind of diagrammatic representation of word groups within a sentence was motivated by the fact that the speaker had just explained “bracketing,” a classification system according to which sentence elements are grouped into constituents marked off by square brackets; more complex linguistic

units encapsulate less complex units. The schematic graph below stands for a fleshed-out sentence, and there is, as in prototypical diagrams, a part-part relationship among the word groupings – alluded to by the bracketing gesture – as well as a part-whole relationship between the individual units and the entire sentence.



Figure 5. A “sentence” represented as a string of words

There is a clear difference, often stressed by the instructors, between viewing a sentence as a horizontally elongated entity, as shown in Figure 5, and depicting hierarchical relations by exploiting the space spanning between both the horizontal and vertical coordinate axes. It seems safe to assume that the culturally ingrained practice of reading and writing from left to right conditions, at least in Western cultures, basic conceptualizations of words and sentences as horizontally arranged combinations of discrete elements. They can be considered as the default model, also available to speakers without theoretical training in linguistics. By contrast, the characteristic feature of syntactic tree diagrams used in generative grammar is a schematic branching structure (comparable to family trees) that spatially represents hierarchical relationships between constituents.

Let us now look at the second type of diagrammatic iconicity within metaphoric gestures which entails direct, image-iconic, renditions of standardized diagrams that are integral to the theoretical apparatus of a given framework. One way in which the tree model is repeatedly reflected in the data is in the form of a triangle-like shape, formed with hands joined at the center top and both forearms held diagonally with elbows pointing outwards. As can be seen in Figure 6 below, the

evoked pyramid directly imitates a tree chunk, thus mirroring a part of the diagram figuring on the blackboard behind the speaker. Alternatively, the speaker drew the same kind of geometric configuration in the air, with both hands starting out at center top, fingertips touching (at the node) and then tracing two diagonal lines downward, one to each side of her body (also represented in figure 6 below).



Figure 6. Triangle depicting a “tree chunk” which branches out laterally

When talking about dependent clauses, the same speaker sketches in example 6 (figure 7) a branch descending toward the lower right of her body (G11 below) by repeatedly moving her right hand first up to eye-level and then diagonally downward to her right side, thereby making a wave-like movement by tilting the hand from side to side. This movement can be assumed to roughly imitate the process of going down along the different nodes and branches of a tree structure.

(6) ((*wavy embedded clauses*))

G11 repeated twice

rh diagonal wavy line from head downward to the right

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

(G11 repeated) G12

index-rh, extended arm and index point to ground
coming in verb phrases] [all the way down] \.



Figure 7. An "embedded clause" as a diagonally descending wavy line



Figure 8. An embedded clause "going all the way down"

Through the consecutive gesture (G12), we learn that there are certain cases in which embedded sentences go "all the way down," at which point the speaker directs her fully extended right arm towards the floor and points with her index finger straight to the ground (as shown in figure 8 above).

Both lines drawn in the air (G11 and G12) evoke a spatialization of the idea of sub-ordination by reaching into comparably low regions of gesture space. Such gestures are schematic images that are informed by a particular theoretical view of relations holding between elements; without the relevant theoretical background, it would probably be difficult to make sense of them. They are visual renditions of relational iconicity which verbal descriptions cannot provide in an equally economic fashion.

3.3.3 Metaphor iconicity

Metaphor iconicity entails 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 through another concept (Liszka, 1996, pp. 37f.). According to McNeill (1992, p. 80) *metaphorics* are 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 reference 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.

Within the abstract domain of grammar, linguistic theories themselves tend to be built on specific sets of metaphors, which can be interpreted in Peircean terms as instances of *metaphor iconicity within metaphor*. In the generative grammar framework, tree structure diagrams combined with the corresponding terminology characterize grammatical relations as well as the behavior of syntactic elements, in terms of both social and spatial hierarchies. It was observed in the data that the conceptual metaphor POWER IS UP (Lakoff & Johnson, 1980) manifests itself through a division of labor between the two modalities. In the manual modality, which naturally lends itself to convey spatial information, metaphorical expressions from the domain of power relations (dominance, control, command, government, subordination) are accompanied by gestures reflecting compatible spatial metaphors such as a tree structure (cf. the triangle forms and diagonal up-down motions discussed earlier): the most powerful, governing elements are situated at the top of branching structures and the dominated, subordinated elements at lower levels. These gestural representations can be seen as reflecting the metaphors HAVING CONTROL IS UP and BEING SUBJECT TO CONTROL IS DOWN (Lakoff & Johnson, 1980, p. 15) and are,

according to the Peircean paradigm, instances of metaphor iconicity within the metaphorically-accessed domain of grammar.

Another theory of grammar covered in the corpus is Emergent Grammar (Hopper, 1998) which 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 following excerpt (example 7) gives an idea of the understanding of grammar as a dynamic system (it is the continuation of example 1, "grammar is not a thing"):

(7) ((emergent grammar))

G13

puoh-tray/cup-lh and puoh-claw-rh with relaxed fingers draw circles over lh
[it sees the use and grammar together (...)]

G14

as G13, but lh is raised twice toward rh
[grammar coming out of the use (...)]

G15

rotation-bh
you] learn [by doing,] \
rather then _

G16

pvoх-box-bh, first made to the right of the speaker, then to the left
[you learn first the rules and then you do them], \

G17

puoh-box-bh pushed together rotation-bh
[it blurs the boundary between (...)] [learning.. and doing].\

As illustrated in figure 9, the gesture illustrating the idea of emergence (G13) consists of the speaker's left (non-dominant) palm-up open hand with slightly curled fingers forming a sort of receptacle and the right hand exhibiting an open palm but facing down and being held above the left hand. 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 is emerging from below.



Figure 9. "Emergent grammar": patterns emerging out of language use

Actions such as "doing" (G15) and "learning and doing" (G18) are depicted with a rotation gesture produced with both hands revolving around one other. The idea that boundaries between grammar and language use are blurred is represented by two hands apart palms facing each other (like the container gesture) which are then pushed towards each other (G17) to convey the idea of fusion. From a Peircean perspective, these representations of blurred boundaries and fusion are also instances of metaphor iconicity within metaphor.

While the previously discussed gestural diagrams of linguistic structure can be said to originate, at least partly, in conventionalized diagrams – proposed in the literature as well as reproduced on blackboards, overhead transparencies, assignment sheets, etc. – the theory of emergent grammar does not have standardized diagrams. This might be a reason why the speaker trying to explain this view needed to be more creative in her visual descriptions of the idea of emerging patterns (Figure 9 above).

3.4 Summary

The sequences of multimodal communication discussed above give an idea of how teachers draw on linguistic resources and gestural illustrations to navigate themselves and their students through abstract knowledge domains whose access and understanding seems to be guided to a high degree by metaphorically conceptualized models and processes. Metaphor is assumed to be anchored in embodied perceptual and kinesthetic experience in the first place; a close look at the data reveals

some of the ways in which gesture may provide a window on the oscillation between the conceptual and the grounded, e.g., between thought, bodily experience, and self-expression. These observations confirm the claim that metaphoric gesture and speech share the task of meaning construal in situated cognition (cf. Cienki, 1998, 2005; McNeill, 1992; Müller, 1998, in press; Nuñez, 2004; Sweetser, 1998, 2007).¹³

As has become evident in the course of the above exposition, there are indeed no clear-cut boundaries between the different semiotic modes; that is, the image is present in the diagram, and both image and diagram reside in metaphor (cf. Danaher, 1998; Hiraga, 1994). Likewise, a symbol may encompass iconic and indexical qualities. Table 1 illustrates the relative hierarchy of semiotic modes and indicates the cognitive-pragmatic principles they are rooted in:

Table 1. Modes of representation according to Peirce (1955)

<i>sign-object relations</i>	<i>sub-types of iconic modes</i>
icon (similarity)	image (single icon)
index (contiguity)	diagram (icon of relations)
symbol (conventionality, habit)	metaphor (parallelism)

In section 4, I suggest ways in which these nesting relations of semiotic modes can shed light onto possible points of cross-fertilization between Peirce's semiotics and cognitive metaphor theory.

4. Peircean semiotics meets conceptual metaphor: Common ground revealed through gesture

Central to the present work is the idea that the intricacies of the iconic modes Peirce distinguished can be discerned, as illustrated above, in metaphoric gestures. In his discussion of cross-fertilizing aspects of Peirce's semiotics and cognitive metaphor theory (Lakoff, 1993; Lakoff & Johnson, 1980, 1999), Danaher (1998) provides a revealing lens on some of the assumptions the two approaches seem to share. Some of these points of intersection can, as I hope to show here, illuminate and also be illuminated by the principles of gestural sign constitution and

13. “[S]ome of the same metaphors appear in gesture as they appear in spoken language when thinking about and discussing abstract domains. The metaphoric gestures, however, can express spatial and force-dynamic information about the speaker's conceptualization of the given event or entity that are not necessarily expressed in speech. [...] D]ifferent metaphors may be expressed in speech and gesture, with the two representing different aspects of a coherent metaphorical model” (Cienki, 1998a, p. 194).

communication. Arguing that both approaches are concerned with the relationship between experience and interpretation and that cognition and semiosis can be seen as two sides of the same coin, Danaher emphasizes the role Peirce's notion of semiotic translation plays in these processes: meaning (interpretants) can be understood as arising from the translation of a given sign belonging to one sign system (e.g., the linguistic) into another sign system (e.g., the conceptual). 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 reflections of different types and stages of experience, with an increasing level of abstraction from icon to index, and finally to symbol. A fundamental assumption is that all experience is given to us semiotically (Danaher, 1998, pp. 188–189). Below, I will highlight some ways in which gestures may attest to the “semiotic reality of image-schemas” (Danaher, 1998, p. 190) and to the semiotic reality of other kinds of abstract patterns such as basic geometric shapes.

4.1 Image schemas as iconic symbols

Image schemas occupy a central place in cognitive approaches to meaning. According to Johnson (1987, p. xiv), image schemas are defined as “recurring, dynamic patterns of our perceptual interactions and motor programs that give coherence and structure to our experience.” Danaher (1998, p. 189) argues that image schemas can be described in Peircean terms as iconic symbols which have acquired their symbolic status through habits of interpretation, e.g. through regular interactions between the conceptual and the experiential, resulting in the perpetual formation of similar interpretants (see section 3.2.3 above on symbols).

An example of a pervasive image schema is the PATH schema which consists of a beginning (source), an end point (goal), and a vector tracing a path between the two points (Johnson, 1987, p. 28); it manifest itself in actions such as walking from one point to another, throwing a ball, punching someone, etc. Such schemas are not static images, but malleable, dynamic patterns of activities that can take on different dimensions, depending on the medium of expression (cf. Johnson, 1987 on visual art; Cienki, 2005 on gesture, and Hampe, 2005 for an overview of the latest advances in image schema research). Independently of the medium or media in which they manifest themselves, image schemas can be seen as generalized (conceptual) structures abstracted from our habitual bodily experience, not only based on perception, but also on motor programs and force gestalts (Talmy, 1988). It appears that some of the senses and channels we use to build our knowledge about the world are directly reflected in gesture: we still seem to be doing many of the original actions of comprehending the physical world when we gesture (e.g., move, mold, draw, trace, grasp, push, pull, weigh, etc., according to Müller's [1998]

system of modi of gestural representation; see also Calbris, 2003; Cienki, 1998a, 2005; LeBaron & Streeck, 2000; Streeck, 2002; and Sweetser, 1998, 2007.).

Given that concepts are assumed to be multidimensional gestalts comprising image-schematic, perceptual, kinesthetic, tactile and other interactional properties (Johnson, 1987, 2005; Lakoff, 1987), it comes as no surprise that gestures tend to portray those dimensions that correspond to both the logic of their own materiality and the logic of space. Gestures are bodily semiotic acts through which embodied image and action schemas may, to some degree at least, be externalized, made visible, and used for meaningful communication. They can bring to light visual and sensorimotor aspects of mental models that would require laborious paraphrases, e.g., in the case of spatial constellations or the direction and manner of movement through space (see Duncan, 2002; McNeill et al., 2001; Müller, 1998; Slobin, 1996).

In the case of the present study, a set of image-schematic and geometric patterns emerged from the data. For instance, the PATH schema materialized in those gestures that trace a horizontal line from the left to the right side of the speaker, thus representing a sentence from its beginning to its end. The patterns are not just derived from the forms; rather, the hand shapes and movements feed into the evolution of the full schema or configuration. The identified salient patterns fall into three categories: (a) image-schematic patterns such as support, surface, contact, object, containment, balance, source-path-goal, scale, linkage, left-right, up-down, center-periphery, part-whole (cf. Johnson, 1987; Lakoff, 1987; Lakoff & Johnson, 1999; Mandler, 1996); (b) geometric shapes such as triangles, circles, and squares; and (c) lines traced along horizontal, vertical, and diagonal axes. These patterns cannot be discussed and exemplified in detail here (cf. Mittelberg, forthcoming), but we will see below some of the ways in which they may build the basis for metaphorical projections that materialize in gesture. It should be emphasized that not all of the abstract forms and structures observed here fit the definitions of image schemas found in the literature and that one needs to carefully distinguish between those patterns that represent geometric shapes (e.g., triangle, circle, square) and directions (e.g., horizontal, vertical, diagonal) on the one hand and those that are reminiscent of image schemas reflecting topological forms (e.g., a closed curve) and qualities such as straightness or curviness (cf. Cienki, 1998b, 2005). Overall, the tendencies observed in the present data offer some insights into how image schemas and other basic abstract forms may motivate gestural representations of abstract entities and structures. It remains to be seen whether they will be supported by investigations across different subject matters and genres.

4.2 Conceptual metaphors as frameworks for semiotic translation

Mediators between the concrete and the abstract, image schemas are assumed to provide basic conceptual structures for metaphorical projection: they motivate the iconic properties of certain types of metaphors, i.e., the schematic structure of the source domain that gets mapped onto the target domain (Hiraga, 1994; Lakoff, 1990, 1993; Lakoff & Johnson, 1980, 1999; Johnson, 1987; Sweetser, 1990; Taub, 2001). In strictly Peircean terms, a sign receives a metaphorical interpretation when calling to mind an icon based on a parallelism (Köller, 1975). Danaher (1998) conceives of conceptual metaphors (such as LIFE IS A JOURNEY) as cognitive symbols, i.e. translation frameworks for metaphoric linguistic expressions (such as "my life is at the crossroads"). They originate in habits of interpretation (Shapiro, 1983 p. 39), whereby a habit is, in the Peircean sense, a "generalizing tendency;" or, put differently, a framework for the association of ideas (1960, 4.478; see also Jakobson, 1956).

The set of image-schematic patterns that emerged from the data (see above) seems to play into the metaphoric and metonymic meaning construction in the ongoing multimodal discourse. As demonstrated above, one of the schemas that is heavily exploited for metaphorical projection is the OBJECT schema (figure 1, examples 1, 2, 4). Using various hand configurations and actions, speakers frequently handle virtual objects, of different sizes, which stand in for linguistic units of different degrees of complexity. Another schema that figures prominently in the data is the SUPPORT schema (Mandler, 1996). This schema was instantiated, for example, in a sequence in which the speaker extends, on the mention of "a noun," a relaxed palm-up open hand toward the audience. As shown in figure 10 below, the open hand serves as a surface, or support structure, on which the speaker seemingly presents an imaginary object, standing in this case metaphorically for the category "noun" (this is a "puoh" variant, cf. Müller, 2004). Similarly to what we have observed regarding the cupped hand in figure 2, here, too, metaphor and indexicality (metonymy) interact in interesting ways: the imaginary object is not represented iconically, but needs to be metonymically inferred as being part of the basic action of holding or presenting something (PRESENTATION FOR PRESENTED; ACTION FOR OBJECT INVOLVED IN ACTION; cf. Panther & Thornburg, 2004). The open palm points to the geometrically undefined object resting on it (for a more detailed discussion on "reference points" [Langacker, 1993] and perceptual and cognitive salience [Panther & Thornburg, 2004] in co-verbal gesture see Mittelberg, 2005, forthcoming; and Mittelberg & Waugh, forthcoming).



Figure 10. An extended palm-up open-hand gesture providing a surface for a “noun”

The concept of **CONTAINMENT** proved to be relevant in several ways, since smaller linguistic units were conceived of as being contained in larger units (**CATEGORIES ARE CONTAINERS, CONSTITUENTS ARE CONTENTS**; Grady, 1998; Johnson, 1987; Reddy, 1979). Phrases and sentences were represented in terms of either a container, a path with a source and goal (figure 5, example 5), a tree diagram (figures 6, 7, 8, example 6), a sequence of adjacent locations in space (example 5), or, put more generally, as spatial structure (**CONCEPTUAL STRUCTURE IS PHYSICAL STRUCTURE**; Sweetser, 1998; for an experimental study on manifestations of the image schemas **CONTAINER, CYCLE, FORCE, OBJECT, and PATH** in gesture see Cienki, 2005).¹⁴

Coming back to Danaher's view, the question that arises here concerns whether metaphoric gestures, too, may provide frameworks for semiotic translation and aid as such in the mediation of knowledge about grammar and linguistic theory. One indication that this might be the case is that gestures were found to reflect conceptual metaphors even if the concurrent linguistic expression was a non-metaphorical technical term such as “noun,” “main verb,” “object of verb,” etc. In another example from the data, an object gesture is used to refer to the non-figurative

notion of “infinitive,” thus suggesting that an infinitive (as abstract and unfamiliar a concept it might be to some of the students) can be seen as a graspable object. This may instill some sort of sensorial reassurance in the students who need to orient themselves in new abstract knowledge domains; it can also be understood as making reference to visually represented words and sentences with which the students are familiar due to their experience with reading and writing.

More research is of course needed to fully understand these mechanisms, but if we find that, across speakers and contexts, metaphorical understandings systematically shine through in gesture, even more frequently and more strikingly than in the speech modality, we have reason to maintain that figurative thought based on embodied schemas does seem to structure, at least in part, the gestural representation of ideas, emotions, and conceptual structure more generally. In a dynamic fashion, that is, through visible action (Kendon, 2004), gesture appeals more intuitively to our senses and sense-making capacities than purely linguistic academic discourse could (see also, e.g., Goldin-Meadow, 2003; McNeill, 1992; Núñez, 2004 and Smith, 2003 for work on mathematics, Kress et al., 2001, Ochs et al., 1996 and Roth, 2003 on physics; Williams, 2004 on time telling; Sweetser, 2007 and Webb, 1996 on philosophy; and Cienki, 1998b, 2005 on moral values).

5. Concluding remarks

The results of this study support the claim that gesture can provide additional insights into how humans conceptualize abstract concepts via metaphor. By demonstrating how the manual modality renders abstract spatial information more tangible, the findings are in accord with what McNeill et al. (2001, p.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.”¹⁵

Gestural representations of grammar were found to have the propensity to reveal metaphorical understandings, e.g., to portray a linguistic unit as an imaginary object, container, line, or as a location in space, even if the concurrent speech was not per se metaphoric, but rather featured technical terms such as noun, main

¹⁴. Regarding language-based research on metaphorical models of language, thought, and speech communication see Goossens (et al.), 1995; Grady, 1998; Reddy, 1979/1993; Sweetser, 1990, 1992; and see Sweetser, 1998 for findings concerning meta-linguistic co-speech gesture.

¹⁵. McNeill et al. (2001, p. 28; italics in the original): “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 that in the other legs of the triad at the same points in the discourse.”

verb, sentence, etc. Grammatical categories as well as operations (e.g., subject-verb agreement or passivization) get translated into the concrete manual modality by evoking correspondences (*parallelisms*, according to Peirce) between the intangible and the embodied, by providing perceptible action and spatial information, even if only in the form of an extended open hand or a sketchy line. Within the metaphorically accessed domain of grammar, Peirce's iconic modes were identified as follows: in gestural representations of single linguistic elements (*image iconicity*), in those that depict relationships holding among parts of a linguistic structure or a theoretical framework (*diagrammatic iconicity*), and in theory-dependent metaphorical understandings of the behavior of grammatical categories such as dominance, emergence, etc. (*metaphor iconicity*). It was further concluded that iconicity and metaphor alone cannot explain the meaning-making processes observed in the data and that iconic modes interact with indexical modes in making abstract entities present and graspable in the immediate context. It is, in certain cases at least, through metonymy (i.e., *indexicality* based on *contiguity*) that the perceptible manual articulators provide cognitive access to the metaphorically construed objects speakers seem to manipulate when talking about abstract categories and structures (see Mittelberg & Waugh, forthcoming).

Drawing on both Peirce's semiotics and cognitive metaphor theory has revealed common ground between the two theories. The observations presented here, based on meta-grammatical discourse, complement previous research on manifestations of iconicity and metaphor in both co-speech gesture and signed languages (see work cited above), which has inspired this study in the first place. Although it remains to be seen whether the tendencies observed so far hold across languages and contexts, this body of work suggests that image schemas and conceptual metaphor may motivate, at least partly, spontaneous gestural representations of abstracta. Since Peirce's pragmaticist semiotic theory was not developed exclusively based on language but has a wide range of applicability, and since gesture can (as spoken language) only be described pragmatically, his fine-grained paradigm is well suited to be applied to gesture. Inversely, the fact that gestures are communicative acts makes them an ideal semiotic system to put Peirce's doctrine to the test and demarcate potential limitations. Whereas Peirce proposed several sub-types of iconicity (similarity), all of which were identified in the data, he did not, to the best of my knowledge, devise sub-types of indexicality (contiguity), which calls for further research in this direction (cf. Fricke's [2007] typology of linguistic and gestural deixis and Mittelberg's [2006] taxonomy of indexical/metonymic modes in metaphoric gestures).

Studying bodily semiotics from the angle proposed here represents only one way of doing so; yet, as I hope to have shown, it can shed light on the externalization, or "ex-bodiment," (Mittelberg, 2006), of mental imagery and internalized

structures and practices, which uses, just as embodiment does, the body as the medium through which these bi-directional processes of abstraction and concretization are channeled (cf. Bourdieu's [1991] notions of *habitus* and *bodily hexis* regarding social norms and practices). There is also contiguity between the mind and the body, with the body being particularly able to personify dynamic and perceptible aspects of figurative thought. The human body functions as the locus where cognitive-semiotic processes take shape, linking knowledge, linguistic expression, and visible action in the formation of utterances (Kendon, 2004), and thus providing anchorage for thought and theory in both physical surroundings and socio-cultural practices: "*Nos premiers maîtres de philosophie sont nos pieds, nos mains, nos yeux* [Our first teachers of philosophy are our feet, our hands, our eyes]" (Rousseau, 1969, p. 360).

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Unexpected metaphors*

David McNeill

Metaphoric gestures are 'expected' in the sense that the metaphoric image is predictable from cultural standards, such as those found in many verbal examples (cf. the 'cup of meaning' image in both "the film had no content" and a gesture formed with a palm upright open hand). But many metaphoric gestures are 'unexpected' – iconic gestures that are revealed to be metaphoric only when the function of the gesture is examined in the surrounding discourse. I illustrate three unexpected metaphors: a gesture depicting a bowling ball being thrust down, a metaphor for the idea of an antagonistic force; a series of gestures of one character trying to reach another, a metaphor for inaccessibility; and a spatial contrast presenting the idea of a contrast itself. None of these metaphors draws on canonical or cultural metaphoric schemas. Unexpected metaphors show a proclivity for making virtually any concrete image a vehicle for something else, even when the image is not among the canonical metaphoric images of a culture.

I shall explain what I mean by 'unexpected metaphors' in due course but I begin with a more familiar type, the 'expected metaphor'. So doing will set the stage and clarify what is actually unexpected about unexpected metaphors.

1. Expected metaphors

The hallmark of an expected metaphor is that it follows an established cultural pattern. Such a metaphor can appear verbally as well as gesturally, although not necessarily in the same utterance. It is 'expected' in the sense that, given a repertoire of metaphors embodied in a culture, form and content are more or less predictable. The accompanying drawings¹ present examples of such gestures. Figure 1 illustrates, in a gesture, what Reddy (1979) called the 'conduit' metaphor in spoken

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1. Fey Parrill is the artist.