

Body – Language – Communication

An International Handbook on
Multimodality in Human Interaction

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Volume 1

Offprint

De Gruyter Mouton

47. The exbodied mind: Cognitive-semiotic principles as motivating forces in gesture

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1. Gesture and the exbodied mind

Emerging from the human body, gestures have been shown to provide valuable insights into the physical grounding and socio-cultural situatedness of cognition and language use. Since they tend to be produced rather unconsciously, gestures may particularly reveal less-monitored aspects of cognitive and emotional processes during communication (e.g., Cienki 1998a; Müller 1998; Sweetser 1998). Given the central place of the *embodied mind* in cognitive linguistics and other experientialist theories that account for multimodal and sensorimotor dimensions of concepts, mental imagery, language, and meaningful experience more broadly, exploring the bodily basis of perceptive, imaginative, and communicative processes seems to be a pertinent endeavor (e.g., Gibbs 2006; Johnson 1987, 2005; Taub 2001; Turner 2006). The assumption that our higher cognitive and linguistic capabilities are shaped by the architecture of our bodies and the way we interact with the world around us has challenged more traditional theories, especially Cartesian approaches, which view intelligence as predominantly abstract and disembodied. According to the theory of the embodied mind (e.g., Gibbs 1994; Johnson 1987, 2007; Lakoff and Johnson 1999; Sweetser 1990; Varela, Thompson and Rosch 1992), “meaning and value are grounded in the nature of our bodies and brains, and in our physical, social and cultural environments” (Johnson 1992: 346). Particularly relevant for gesture is the insight that mental “imagery is accompanied by sensorimotor sensations, or whole “body loops” (Damasio, 1994), which give imagistic experience its rich phenomenological quality” (Gibbs 2006: 138). Complementing cognitivist theories, Bourdieu’s (1990) notion of the *habitus* unites historically formed behaviors with a deep enculturation of the body, reflecting and engendering schemata of perception, thought and symbolic action.

Building on the premises of the embodied mind, and looking at it from the inside out, the present approach to gesture centers on how *cognitive-semiotic principles* – such as iconicity, indexicality, metaphor, metonymy, and image schemata – interact in motivating and structuring multimodal messages and performances. While acknowledging how internalized patterns of action and cognition arise, the focus is on how they might drive processes of meaningful expression, and visibly manifest themselves in communicative bodily movements integrated with spoken discourse. Another concern

is how the specific material properties of each medium may determine the cross-modal distribution of semantic features and pragmatic functions (Mittelberg 2006). Studying bodily semiotics from the angle proposed here aims to shed light on the “ex-bodiment” (Mittelberg 2008: 148; 2010b: 376) of mental imagery, internalized conceptual structures, action patterns, and felt qualities of experience, whereby the human body functions, as in processes of embodiment, as the living medium through which such bidirectional mechanisms of abstraction and concretization are shaped.

Exbodiment entails the motivated semiotic structure *inherent* to communicative gestures made with the hands and arms, as well as to expressive postures and full body movements. Action routines and embodied image schemata are assumed to drive the body’s intuitive expressions, as well as more consciously produced descriptions and (re-)enactments of observed, lived or imagined experience, including physical and social forces. This view also accounts for gestural signs exhibiting dimensions that point beyond perceivable bodily semiotics by metonymically alluding to imaginary physical objects, virtual movement traces or spatial projections that appear to be *contiguous* to the gesturing hand(s). Gestural manifestations of basic geometric patterns, image-schematic structures and metaphorical understandings of abstract ideas or processes may be observed to emerge when speakers seem to outline or manipulate virtual physical objects, relations or structures, while talking about emotions, inner mental states or abstract knowledge domains (e.g., Cienki and Müller 2008; Mittelberg 2010b; Müller 2008; Núñez 2008). Gestures are thus a means to express, reify and show to interlocutors both imagined and sensed dimensions of mental imagery. They may lend a perceptible gestalt to concepts, ideas and memories, if only for a moment and if only in the form of furtively drawn, invisible lines or demarcated chunks of space. Primary metaphors (Grady 1997), in particular, have been shown to emerge in the gestural modality, even if the accompanying speech is non-figurative (Mittelberg 2006, 2008). Hence, one of the guiding questions is how cognitively entrenched patterns of experience – arisen from visual perception, navigation through space, tactile exploration, and other practices of bodily interaction with the sensorial and social world – may motivate gestural sign formation and interpretation, as well as structure the (interactive) use of gesture space.

The semiotic perspective taken here further places a focus on gesture interpretation, in which one’s own habitual movements and actions as well as one’s personal semiotic history may guide the understanding of multimodal semiotic acts performed by others. As we may express “felt qualities of our experience, understanding, and thought” (Johnson 2005: 31) through our own gestures and body postures, observing others doing so enables us to see and feel what they are trying to convey (Mittelberg 2010a). Johnson (2007: 162) further points out that understanding other people’s actions involves mental simulation of physical actions: “This deep and pre-reflective level of engagement with others reveals our most profound bodily understanding of other people, and it shows our intercorporeal social connectedness”. The recent discovery of mirror neurons indicates that the sensorimotor areas that are active in the brain when a person performs a goal-directed action are triggered when the person observes someone else perform the action (e.g., Rizzolatti and Craighero 2004). These observations are also crucial with regard to gestures and their role in language understanding (Skipper et al. 2009) as well as in respect to the human capacity to assume and multimodally express multiple viewpoints on a given experience (Sweetser 2012: 12–16).

A gesture is – at least in many cases – a gesture, because the hands do not manipulate a physical object or structure, but rather pretend to do so. This letting go of the material world in imitative gestures turns a transitive manual action with an object or a tool in hand into a more abstract communicative hand movement, from which objects or tools may still be inferred. Indeed, gestures may reflect the speakers' embodied knowledge of the material world and its affordances in various ways. Gesturing hands may also seek and establish contact with the physical environment and with what Hutchins (1995) calls "material anchors" in cross-modally orchestrated processes of manufacturing meaning (Streeck 2009; see also Enfield 2009; Goodwin 2007; Lebaron and Streeck 2000; Williams 2008). Such grounded activities of multimodal cognition and communication also fall into the scope of the exbodied mind, understood as always being indexically anchored in the concreteness of the human body, its physical habitat, and the intersubjective dynamics of communication (e.g., Zlatev et al. 2008).

In the present framework, these phenomena are described with help of the fundamental semiotic modes similarity and contiguity, as well as their subtypes, which provide means to capture both fine distinctions and transient cases regarding the gestural forms and functions of interest here. It will be argued that while the perceived *similarity* between the bodily actions and gestures we observe in others and our own perceptual experiences and physical routines may determine how we cognitively and physically align with our interlocutors, similarity is only one pathway to understanding the intentions and semantics of communicative behavior (for mimicry in gesture see, e.g., Holler and Wilkin 2011). As will be discussed in detail below, *contiguity* relations between the gesturing body and the material and social world also play a central role in sensing and interpreting the meaning of coverbal gestures. In addition, contact, adjacency and impact are different kinds of contiguity relations between entities in the physical world or in semiotic structure that may be established, highlighted, or deleted in gestural sign formation and interpretation.

For a brief preview of the kinds of distinct semiotic processes that will be discussed in detail throughout this article, let us look at two gestural examples (taken from Mittelberg 2010b). Both persons shown below are US-American linguistics professors lecturing about grammatical categories. In the sequence where the gesture shown in Fig. 47.1 occurs, the speaker introduces the notion of semantic roles: *To account for this... we use names of semantic roles that bounce around in linguistics... agent, patient, recipient, goal, experiencer... those are semantic roles*. On the mention of *recipient* she produces a palm-up open hand with slightly bent fingers held near her body at hip level. In this multimodal performance unit, the uttered word *recipient* refers to a specific semantic role, i.e. an abstract grammatical function, which the teacher literally personifies with her entire body: in that very moment, she is a recipient. Given this particular combination of body posture, arm configuration and hand shape, we can see a similarity relation between this unified corporeal image and a person holding something. It is left unspecified whether her open hand is holding an imaginary object already received, or whether it merely signals readiness to receive something. However, in her speech she does not refer to any possible object, but solely to the role she is assuming. This bimodal portrayal of an abstract function is afforded through a) iconicity between the semiotic structure inherent to her body posture plus gesture and the mundane action of holding/receiving something; b) a latent contiguity relation between the open hand and a potential object; and c) metaphor (i.e. personification).



Fig. 47.1: Personification of the semantic role *recipient*



Fig. 47.2: Emergent *noun* on open palm

A closer look at the pragmatic functions of the two seemingly similar gestures above reveals that their similarity mainly resides in the form features of the gestural articulators: they are variants of the palm-up open hand (Müller 2004). Without considering the speech content it would be impossible to establish which of the semiotic modes mixing in each of these multimodal explanations predominantly contribute to their meaning. Explaining the framework of emergent grammar, the speaker shown in Fig. 47.2 points out that *a priori ... you cannot define a noun from a verb*. When saying the word *noun*, this palm-up open hand gesture, slightly extended toward the student audience, constitutes a perceivable surface, i.e. a material support structure, on which the speaker seems to present the abstract category *noun* reified as an imaginary tangible object. In cognitive semantic terms, this gesture seems to manifest the image schemata *SUPPORT*, *SURFACE*, and *OBJECT* (Johnson 1987; Mandler 1996), as well as the primary metaphor *IDEAS ARE OBJECTS* or *CATEGORIES ARE CONTAINERS* (Lakoff and Johnson 1980). The point here is that iconicity and metaphor do not suffice to account for the particular form and function of this hand configuration; there is no iconic relationship between the shape of the manual articulator and a grammatical category. Rather, an imputed contiguity relation between the open palm and the imaginary noun becomes significant: the simultaneously uttered word *noun* draws attention away from the action to the imaginary entity which needs to be metonymically inferred from the open hand.

In the sections below, first the different theoretical strands building the conceptual foundation of the present approach will be sketched. After discussing processes of motivation and abstraction in gestural sign formation, a set of cognitive-semiotic principles will be defined and illustrated with gestural examples. Special attention will be paid to metonymic modes and image-schematic structures that seem to feed into both literal and metaphoric meaning construction in multimodal discourse. The overall goal of this article is to show some of the ways in which gestures might attest to the semiotic reality of embodied conceptual schemata and action patterns, by invoking aspects of their visuo-spatial, material and multisensory origins.

2. Theoretical points of departure: Peirce, Jakobson, and cognitive semantics

The cognitive-semiotic approach to gestural sign motivation and interpretation laid out in this article combines contemporary embodied views of language and cognition (see above) with traditional semiotic theories. The framework was originally developed to account for multilayered processes of gestural sign formation and the emergence of meaning in multimodal academic discourse about grammar and linguistic theory (Mittelberg 2006, 2008, 2010a; Mittelberg and Waugh 2009). Taking Peirce's (1955, 1960) triad of *similarity* (iconicity), *contiguity* (indexicality) and *conventionality/habit* (symbolicity), as well as the three subtypes of iconicity (*image/diagram/metaphor*) as a starting point, this work further builds on Jakobson's (1956, 1960) balanced theory of *metaphor* and *metonymy* as two major modes of association and signification. Jakobson's work here functions as a juncture between Peirce's typology and more recent work on cognitive iconicity (S. Wilcox 2004) and contiguity (Dirven and Pörings 2002; Peirsman and Geeraerts 2006), frame metonymy (Dancygier and Sweetser 2005; Fillmore 1982), as well as reference-point phenomena (Langacker 1993), and pragmatic inferencing (Panther and Thornburg 2004). Embodied image schemata and force dynamics also fulfill a crucial role in that they have a mediating function between physical experience and abstract thought, as well as between literal and metaphorical aspects of meaning (e.g., Hampe 2005; Johnson 1987; Talmy 1988).

One of the underlying assumptions is that cognitive semantics and the older but still relevant semiotic frameworks share central tenets regarding patterns of experience, expression and interpretation (Danaher 1998; Hiraga 2005; Mittelberg 2008). There seems to be agreement that cognition is inherently multimodal, comprising perceptual, sensorimotor, tactile, image-schematic, and interactional dimensions (e.g., Gallese and Lakoff 2005; Johnson 2007; Krois et al. 2007). Moreover, meaning is not assumed to reside in the material form a sign takes (i.e., a word or a gesture), but to arise in the dynamic gestalt of a mental representation or some other kind of cognitive and/or physical response to a perceived sound, word, image, or human behavior.

Adopting a wider semiotic perspective allows us to account for both a highly symbolic sign system, such as language, and visuo-spatial modalities, such as coverbal gesture and body posture. According to Peirce's pragmatist doctrine of signs, cognition and semiosis go hand in hand: "we think only in signs" (Peirce 1960: 169). Peirce's dynamic triadic model of the sign process has informed gesture research done from several perspectives, including psycholinguistics (e.g., McNeill 1992), linguistics (e.g., Andrén 2010;

Fricke 2007) and anthropology (e.g., Enfield 2009; Haviland 2000). Peirce's widely cited definition of the sign is also provided here, particularly to recall the terms *Representamen* (the material form the sign takes) and the *interpretant*, i.e., the response/association the Representamen evokes in the mind of the sign receiver. Hence, without an interpreting mind there is no sign, that is, no semiosis and no meaning.

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. (Peirce's 1960: 135, § 2.228; italics in the original)

A strong point of this model is that it includes the receiver as a participant actively involved in making meaning of the signs she or he perceives. So the notion of interpretant is central for several reasons: it marks the moment when meaning emerges in interpretative processes (some of which might be propelled by metaphoric associations, for example, while others by metonymic); it accounts for different minds with different semiotic experiences and habits; and it exhibits a potential for augmentation regarding different degrees of semiotic density and ways to link up the intended object with semantic structure in the conceptual system (Mittelberg 2006: 43).

While responding to the need of categorizing gestures for the purpose of analysis, many scholars have come to realize that working with categories, even if seen as not absolute, hardly does justice to the polysemous and multifunctional nature of gestural forms (cf. Müller 1998). McNeill, for instance, moved away from his original taxonomy (i.e. *iconics*, *deictics*, *metaphorics*, *beats*, and *cohesives*; McNeill 1992) in preference to dimensions such as *iconicity* and *metaphoricity* (McNeill 2005). In light of the noted multifunctionality of gestural signs, the present approach advocates, in alignment with Peirce (1960) and Jakobson (1987), a *hierarchical* view, asserting that among the different semiotic modes that may mix and interact in a given gestural sign, one needs to establish, in conjunction with the concurrent speech and other contextual factors, which one(s) actually determine(s) its specific form and local function.

Before laying out in detail the workings of the cognitive-semiotic principles of central interest in this article, a few words need to be said about the corpus from which the examples discussed below are taken, as well as about the empirical methods employed. The corpus consists of naturalistic academic discourse and coverbal gestures produced by four US-American linguists while teaching introductory courses to linguistics. On the basis of twenty-four hours of multimodal discourse, those segments were selected in which referential gestures (cf. Müller 1998: 110–113) portray linguistic units of different degrees of complexity, grammatical categories, and syntactic structures and operations. Transcriptions included the speech of each segment, the course of each gestural movement excursion according to its phases (Kendon 2004: 111), and the exact speech-gesture synchrony. To record the kinesic features of the gestures, the most widely used coding parameters were used: hand presence, hand dominance, hand shape, palm orientation, movement manner and trajectory, and the location in gesture space. Opting for a data-driven typology of manual signs, the corpus was searched for prominent hand shapes and movement patterns recurring across speakers and contexts. A set of schematic images of objects, actions and relations emerging from the data

then provided the basis for the analysis of cross-modal processes of meaning construction. For each gesture unit, the information conveyed in the concurrent speech segments was considered to determine the interaction of the different iconic, metonymic and metaphoric modes (for more details regarding the methods, see Mittelberg 2007, 2008, 2010a).

Since the relationship between iconicity and metaphor in gesture has already received ample attention (e.g., Cienki and Müller 2008), this article focuses on the interaction between iconicity and indexicality on the one hand and between metonymic and metaphoric modes on the other. Assigning considerable weight to metonymic principles and the role they play in processes of perception, abstraction and inferencing, the approach presented here aims to offer insights into the motivated parthood of communicative movements of the human body.

3. Motivation in gesture

From the perspective on gesture taken here the issue of motivation is central. Taking the gestural material as a starting point, the intention is to establish how the different modalities share the semiotic work of creating form and meaning. The task is to identify the forces that might have motivated the form features and pragmatic functions of a given gesture or sequence of gestures. One complicating factor in gesture analysis is the fact that the semiotic material we are looking at consists not only of observable physical components – such as body posture, bodily motion as well as configurations, movements and locations of hands and arms – but also of immaterial dimensions such as virtual movement traces left in the air or imagined surfaces, objects or points in space. Compared to static visuo-spatial modalities such as drawings or sculptures, gestures typically evoke persons, objects, actions, places or relations in a rather fluid and ephemeral way. As the articulators in the speaker's mouth constantly form new configurations to produce speech sounds, hands may also constantly change their articulatory shape as well as the manner and trajectory of movement when in gestural motion (Bouvet 2001; Bressems this volume). What a potentially polysemous gestural form stands for can only be determined by considering the simultaneously produced utterances. Speech and its accompanying gestures have been shown to assume specific semiotic roles in processes of utterance formation (Kendon 2000: 53). Being “motor signs” (Jakobson 1987: 474), gestures are prone to depict, or actually constitute, spatial and dynamic dimensions of what the speaker is talking about, thus grounding information (partly) conveyed through speech in a visuo-spatial context sharable by interlocutors (e.g., Müller 2008; Sweetser 1998, 2007). Gestures may further regulate social interaction, either explicitly or in the form of a sort of subtext unfolding in parallel to the ongoing conversation (e.g., Bavelas et al. 1992; Müller 1998).

Within the field of linguistics, the arbitrary versus motivated nature of human language has been a matter of great debate (Jakobson and Waugh 1979; Saussure 1986). Drawing on Peirce's notions of image iconicity and diagrammatic iconicity, Jakobson (1966) not only demonstrated that iconicity is a constitutive factor at all levels of linguistic structure (phonology, morphology, syntax and the lexicon; Waugh 1976, 1994), he also devised different kinds of contiguity relations in language and other sign systems. As we will see below, Jakobson's distinction between inner and outer contiguity takes center stage in the present framework and serves as the basis for different

types of metonymy (Jakobson and Pomorska 1983). Iconicity and metonymy have also been ascribed a constitutive role in the formation of signs in American Sign Language (ASL) (Mandel 1977; P. Wilcox 2004; S. Wilcox 2004). Investigating the relationship of iconicity and metaphor in American Sign Language, Taub (2001) suggested a set of principles including *image selection* (based on similarity or contiguity), *schematization* (through abstraction), and *encoding* (through conventionalization). Compared to highly symbolic sign systems such as spoken and signed languages, spontaneous gestures do not show the same degree of formalized conventionalization and grammaticalization. Hence, some of the most interesting questions that arise here concern the ways in which gestures exploit and create similarity and contiguity relations differently than language and how these modes feed into processes of conventionalization.

In his observations on “the body as expression”, Merleau-Ponty (1962: 216) succinctly states:

It is through my body that I understand other people, just as it is through my body that I perceive “things”. The meaning of a gesture thus “understood” is not behind it, it is intermingled with the structure of the world outlined by the gesture.

This kind of “structure of the world” (Merleau-Ponty 1962: 216) as profiled in a gesture can be assumed to comprise different kinds of structure: physical, semiotic, and/or conceptual. It may reflect the spatial structures and physical entities humans routinely perceive and interact with in their daily lives and professional practices (Goodwin 2007; Streeck 2009). When asking someone for a small bowl, for instance, we can iconically illustrate the desired object by evoking the shape of a round container through holding two cupped open hands closely together with palms facing upward. Such a hand configuration not only expresses the idea of a bowl (as the word “bowl” does), but it actually constitutes for a moment a container of that sort. In linguistics courses, gestures are one of many visual semiotic resources used to explain abstract categories and functions. For example, teachers have been found to trace triangle-shaped figures in the air, thus imitating conventional tree diagrams used in textbooks and on blackboards to visualize hierarchic sentence structure (Mittelberg 2008). In view of gestures that lend a tangible form to abstract ideas and structures, the question of motivation becomes more complex and leads us into the realm of figurative thought and expression. We then need to ask in what ways gestures portraying abstracta, beliefs, mental or emotional states might be shaped by construal operations such as metaphors, metonymies, and framing (e.g., Cienki 1998a; Cienki and Müller 2008; Evola 2010; Gibbs 1994, 2006; Harrison 2009; Mittelberg 2010a; Müller 1998, 2008; Sweetser 1998, 2012).

Indeed, as Merleau-Ponty pointed out, getting at the meaning of a gesture does not seem to be simply a matter of reference. Gestures may in the very moment of expression actually “be” what they are taken to “be about”, and create new semiotic material from scratch which then can take on a life of its own in the ongoing discourse and may as such serve as a reference structure for subsequent multimodal explanations (e.g., Fricke 2007; McNeill 2005). Gesture researchers have come to differentiate gestures that carefully depict an existing and experienced place, object, or event, such as a certain tool one has used or an animated cartoon one has watched, from those gestures that seem to reflect a concept, a conceptual image/schema, or a vague idea (e.g., Andrén 2010; Cienki and Mittelberg 2013; McNeill 1992; Mittelberg 2006; Müller

1998). In his elaborations of the “thinking hand”, Streeck (2009: 151) distinguishes between two gestural modes: *depicting* (e.g., via an iconic gesture portraying a physical object) and *ceiving* (i.e. via a gesture conceptualizing a thematic object). He attributes the latter mode to a more self-absorbed way of finding a gestural image for an emerging idea. Fricke (2007) speaks of *interpretant gestures* which, in multimodal instruction giving, may reflect a general concept of an architectural structure, such as a gate, instead of describing the idiosyncratic shape of a particular passageway that does not represent a prototypical member of the category.

Additional subjective factors influencing which elements of a given object or scenario are attended to, and how the locally salient features are encoded cross-modally, pertain to the *viewpoint* the sign producer adopts, e.g. character or observer viewpoint (McNeill 1992). As a substantial body of recent research has shown, viewpoint is a universal and extremely flexible construal operation shaping expressions across modalities in spoken and signed languages (e.g., Dancygier and Sweetser 2012). As Sweetser (2012: 1) points out, “cognitive perspective starts with bodily viewpoint within a real physical Ground of experience”. Being existentially tied to the speaker’s body, as well as to its material and socio-cultural context, gestures, whether they be predominantly iconic or deictic, are inherently indexical (Mittelberg 2008). While gestural and corporeal signs tend to reflect aspects of the gesturer’s own bodily disposition and stance, they may, at the same time, reflect multiple, shifting viewpoints on a given scene, thus also embodying the perspective of others (Sweetser 2012).

What we can draw from these observations for the concept of the exbodied mind is that motivated gestural sign constitution reflects – besides the primordial role of movement, space and material culture – the workings of the speakers’ cognitive filter, resulting in, for instance, viewpointed conceptual images and structures. In this way, they may attest to the psychological and semiotic reality of dynamic multimodal processes of conceptualization (e.g., Cienki 1998b; Ladewig 2011; Mittelberg 2008; Müller 2008; Núñez 2008).

4. Abstraction, metonymy, and semiotic grounding

As any kind of signs, gestures are always partial representations of something else; hence, they tend to be metonymic in one way or another. So as most processes of perception and expression, gestural sign formation implies abstraction (e.g., Bouvet 2001; Mittelberg 2006; Müller 1998):

Actually, the portrayal of an object by gesture rarely involves more than some one isolated quality or dimension, the large or small size of the thing, the hourglass shape of a woman, the sharpness or indefiniteness of an outline. By the very nature of the medium of gesture, the representation is highly abstract. What matters for our purpose is how common, how satisfying and useful this sort of visual description is nevertheless. In fact, it is useful not in spite of its spareness but because of it. (Arnheim 1969: 117)

Before teasing apart the distinct ways in which this useful metonymic “spareness” (Arnheim 1969: 117) of gestures may be brought about, let us first look more closely at what they might be metonymic of by considering the notion of the Object in Peirce’s triadic sign model (henceforth, the elements of the Peircean sign model will be capitalized).

We will then narrow in on his concept of the Ground, as principles of abstraction and partial representation are implemented already at this very basic level of the semiotic process.

Peirce's understanding of what a semiotic Object can be is extremely wide and ranges from existing to non-existing things: it encompasses both concrete and abstract entities, including possibilities, goals, qualities, feelings, relations, concepts, mental states, and ideas (e.g., Kockelman 2005). Anything can be an Object, as long as it is represented by a sign (Shapiro 1983: 25). From a cognitive semantics perspective, the non-physical Objects listed above remind us of common target domains of conceptual metaphors. As a large body of research on multimodal metaphor has shown, metaphorical understandings can be expressed in either speech or gesture, or simultaneously in both modalities (e.g., Müller and Cienki 2009). Moreover, the nature and properties of the Object determine, according to Peirce, the sign. So in the case of a gesturally expressed metaphor, the Object of the gesture can be said to be the source domain of the underlying mapping. In this case, the "structure of the world", to come back to Merleau-Ponty's (1962: 216) observations quoted above, that might determine the form of a metaphoric gesture, would be conceptual structure underlying a metaphoric projection.

We are now in a position to bring Peirce's concept of the *Ground* of a sign carrier, i.e. of the Representamen, into the picture, which accounts for the fact that sign vehicles do not represent Objects with respect to all of their properties, but only with regard to some salient or locally relevant qualities. These foregrounded features function as the Ground of the Representamen. In Peirce's own words (1960: 135, § 2.228; italics in the original):

The sign stands for something, its object. It stands for that object, not in all respects, but in reference to some sort of idea, which I sometimes called the *ground* of the representamen. "Idea" is here to be understood in a sort of Platonic sense, very familiar in everyday talk; I mean in that sense in which we say that one man catches another man's idea.

The Ground can thus be understood as a metonymically profiled quality of an Object that is portrayed by a Representamen; as such, the Ground puts the Representamen (e.g., two cupped open hands held together) to an interpreting mind into relation with an Object (e.g., a small bowl). In light of the supposed partiality of perception and depiction, viewpoint appears to be a decisive factor also here. As has been pointed out above, whether a sign producer adopts, for instance, character or observer viewpoint will influence which aspects of the Object may be abstracted and feed into the Ground of the Representamen. The multimodal and multidimensional sign processes of interest here can be devised based on basic semiotic grounding mechanisms (Soneson 2007: 40), which are introduced next and will inform the gesture analyses provided in the ensuing sections.

A sign with a strongly *iconic Ground*, for instance, is a partial, i.e. metonymic, rendition of what it represents based on a perceived or construed similarity. Similarity, as is well known, may be perceived in *images* per se, but also in two other subtypes of what Peirce called *hypoicons*: *diagrams* (i.e. icons of relations) and *metaphors* (implying a parallelism; Peirce 1960: 135). In Peirce's own words (1960: 157; § 2.276), "[i]cons have qualities which "resemble" those of the objects they represent, and they excite

analogous sensations in the mind". While there might be a visual bias in the term *icon*, it encompasses a multimodal understanding of iconicity and hence also includes those "sensations" that cause something to feel, taste, look, smell, move, or sound like something else. This view again corresponds well with the multisensory basis of embodied image schemas and metaphors assumed in cognitive semantics (cf. section 6 for details). It also encompasses representational gestures that are motivated by mental imagery and conceptual structures, that is, by a mental Object: the cupped hands mentioned above evoking the kind of bowl one is looking for (*image icon*); hands tracing the relations between concepts making up a theoretical framework (*diagram*); or an open cupped hand that represents an abstract category in the form of a small container (*metaphor*; cf. Fig. 47.5 below and Mittelberg 2008). In addition, iconic gestures may take shape in different ways. Inspired by the tools, media and mimetic techniques visual artists deploy, Müller (1998) introduced four modes of representation in gesture: *drawing* (e.g., tracing the outlines of a picture frame), *molding* (e.g., sculpting the form of a crown); *acting* (e.g., pretending to open a window), and *representing* (e.g., a flat open hand stands for a piece of paper). If one applied all four modes to the same Object, each resulting gestural Representamen would establish a different kind of iconic Ground and hence highlight different features of the Object. This means that each portrayal would convey a different "idea" of the Object (Peirce 1960: 135; § 2.228).

Pointing gestures are signs with a highly *indexical Ground*. 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. According to Peirce (1960: 143; § 2.228), "[a]n Index is a sign which refers to the Object that it denotes by virtue of being really affected by that object". Indeed, the spatial orientation of highly context-sensitive pointing gestures depends on the location of the Object they are directed toward, and through the act of pointing the Object is established via a visual vector (cf. Fricke 2007; Haviland 2000; Kita 2003). Another example, not as strongly indexical though, is the palm-up open hand gesture discussed above (cf. Fig. 47.2), since there is an indexical relation between the open palm and the category *noun* it seems to be presenting to the audience. Here we can see an interesting interaction between the speech content and the gestural grounding mechanism: not the act of holding per se (which would presuppose an iconic Ground) is pertinent, but the entity (or the space) to be imagined as being in contact with the open palm becomes the lieu of attention and thus the lieu of meaning (cf. section 5.3. for details and more examples). In view of these observations, iconic and indexical grounding mechanisms may be regarded as two routes of abstraction competing in corporeal/gestural sign creation and being tightly integrated with the information provided in speech. As will be discussed next, Jakobson proposed distinct types of contiguity relations and metonymic modes that seem to correlate with these basic mechanisms of semiotic grounding.

5. Jakobsonian contiguity relations and metonymic modes in gesture

Roman Jakobson introduced Peirce's semiotic theory to a larger audience of linguists in Europe and the United States (Wagh and Monville-Burston 1990). The concepts of similarity and contiguity, as the two essential structural relations between signs, also

provide the basis for Jakobson's (1956) theory of metaphor and metonymy seen as two opposite modes of association and signification that structure both linguistic and non-linguistic signs. Like all semiotic modes, they are not mutually exclusive: signs tend to exhibit varying degrees and different hierarchies of both (Jakobson 1966: 411). Deriving his understanding of metonymy from Peirce's notion of contiguity (and indexicality), Jakobson emphasized the difference between synecdoche and other types of metonymy:

One must – and this is most important – delimit and carefully consider the essential difference between the two aspects of contiguity: the exterior aspect (metonymy proper), and the interior aspect (synecdoche, which is close to metonymy yet essentially different). To show the hands of a shepherd in poetry or the cinema is not at all the same as showing his hut or his herd, a fact that is often insufficiently taken into account. The operation of synecdoche, with the part for the whole or the whole for the part, should be clearly distinguished from metonymic proximity. [...] the difference between inner and outer contiguity [...] marks the boundary between synecdoche and metonymy proper. (Jakobson and Pomorska 1983: 134)

In the following subsections, we will first see how, when pragmatically operationalized in a given sign process, these two contiguity relations may feed into corresponding metonymic processes (i.e. internal and external metonymy). The analytical framework, comprising different kinds of gestural icons and indices brought about through different kinds of metonymic processes, will then be presented and exemplified with examples from the multimodal corpus (Mittelberg 2006). Modes of interaction between metonymic and metaphoric processes will also be addressed (Mittelberg and Waugh 2009). (Tab. 47.1 in section 5.4 provides a synopsis of the taxonomy of cognitive-semiotic principles developed in sections 5.1–5.3 below.)

5.1. Internal and external metonymy

Jakobson's understanding of contiguity and metonymy allows the gesture analyst to account for distinct processes that seem to be central to the formation and interpretation of manual as well as corporeal signs implying the entire body. Before looking at gestural examples, definitions and examples will be provided here.

Internal metonymy rests on inner contiguity relations, e.g. as exploited by the principle of partiality: a part stands for another part that is connected to the first; a part stands for the whole; or a whole stands for a part. For example, in the expression *there are many new faces in the group*, *faces* refers to a prominent part of persons. The face is part of the head which is a part of the physical structure of a human body. *Everyone lives under one roof* would be another example, in which *roof* stands for the entire house of which it is a physical fragment. As these cases show, Jakobson integrated what is generally known as synecdoche into his notion of internal metonymy (cf. Peirsmann and Geeraerts 2006; Radden and Kövecses 1999). *Internal* suggests that the internal structure of a reference object is broken down into fragments, and one of these fragments (e.g., *face* or *roof*) is taken to refer to the entire structure (e.g., *body* or *house*). In visual signs, internal metonymy also drives the abstraction of essential properties inherent to a given Object, resulting in the portrayal of aspects of its contours, dimensions, or internal structure.

External metonymy involves different kinds of outer contiguity relations, particularly those pertaining to contact, adjacency, and impact; they also include instrument, source, as well as cause and effect. In the utterance *The White House remained silent, the White House* refers to the U.S. President or his spokesperson. The contiguity relations holding between the place, or building, and its inhabitants are of spatial and pragmatic nature; however, the people living and working inside the building are obviously not part of its architectural structure (as the roof in the example for internal metonymy given above). As the house and the persons belong to the same experiential domain, this expression can also count as an example of frame metonymy (Dancygier and Sweetser 2005; Fillmore 1982). Another example of external metonymy is the question *Would you like another cup?* If this utterance is meant to ask the addressee if she cares for more tea, for instance, the *cup* stands for its adjacent content, i.e. the beverage, which is not part of the material structure of the container cup, but external to it.

In view of the different types of contiguity relations and metonymic modes put forth by Jakobson, the assumption guiding the ensuing gestural analyses is that internal metonymy correlates with signs exhibiting a predominantly iconic Ground, and external metonymy correlates with signs exhibiting a predominantly indexical Ground (cf. Tab. 47.1). Although it is understood that conventionality/habit, the third type of sign-Object relations in Peirce's triadic typology, can be observed in these dynamic sign processes to varying degrees, processes of conventionalization cannot be treated in detail here for lack of space (cf. Mittelberg 2006).

5.2. Internal metonymy in gestures with predominantly iconic Ground

Metonymy has been shown to assume an important role in manual sign formation (e.g., Bouvet 2001; Gibbs 1994; Mandel 1977; Müller 1998; P. Wilcox 2004; Taub 2001). In this body of work, the main focus has been synecdoche which corresponds, as we have just seen, to Jakobson's idea of inner contiguity (i.e., internal metonymy). Highlighting some of the ways in which iconicity and metonymy may jointly drive form and meaning construction in dynamic (metaphoric) visuo-spatial signs, the analyses presented in this subsection will proceed according to Peirce's (1960: 135; cf. section 4 for definitions) subtypes of iconicity: image, diagram, and metaphor.

IMAGE ICON (POSTURE; ACTION; OBJECT; EVENT; ETC.). Through internal metonymy, salient qualities of a given action, object, or idea may be profiled in a gestural/corporal sign. There is a difference between sign processes where the body itself imitates a particular posture or action and those where the hands iconically represent or delineate some of the essential features of an object or event. For example, the person personifying the semantic role *recipient* shown in Fig. 47.1 renders the essential features inherent to a common physical action/posture such as holding something in one's hand. It qualifies as a visual sign with a highly iconic Ground. In light of the different iconic modes proposed by Peirce, this gesture is an example of an image icon resulting from a particular interaction of iconicity and internal metonymy. Moreover, since the speaker literally becomes a recipient, this gestural portrayal reflects character viewpoint (e.g., McNeill 1992; Sweetser 2012). As pointed out earlier, in the case of this particular gesture, the mention of the Object, the role *recipient*, in the concurrent speech centers our attention on the person. According to conceptual metaphor theory (e.g., Lakoff and Johnson 1980, 1999), personifying an abstract grammatical function entails a

metaphoric mapping. In the present framework this corporeal sign is first and foremost analyzed as an image icon, that is, a literal portrayal of the idea of a *recipient* simultaneously expressed in speech.

Another example of a gestural form with a strongly iconic Ground is given in Fig. 47.3 below. This tracing gesture starts out with both hands joined in the center of gesture space. Then the hands move laterally outward until both arms are fully extended, as if they were tracing a horizontal line or chain. Here, too, the speaker's verbal utterance – *we think of a sentence as a string of words* – disambiguates a potentially polysemous schematic gestural image icon. So the focus is not on the body itself or the action of tracing, but on the virtual line drawn in the air that results from the action of tracing. Cross-modal processes of meaning construction also play a crucial function here in that the trace is an image icon of the idea of a string that is simultaneously expressed in the speech modality. Via internal metonymy the imaginary line stands for an entire sentence. Whether this schematic image reifies abstract conceptual structure or whether it is a minimal icon of a graphical representation of a sequence of written words, it is likely to result from cognitive processes of visual perception and analysis. In contrast to the previously discussed gesture (Fig. 47.1), this gesture exhibits observer viewpoint.



Fig. 47.3: *A string of words* (image icon)



Fig. 47.4: Noun *teach-er* (diagrammatic icon)

DIAGRAMMATIC ICON (INTERNAL RELATIONS; STRUCTURE). While the focus of the sentence string of Fig. 47.3 was on its linear gestalt as a whole, the following gesture puts into relief the inner structure of a word (cf. Fig. 47.4). In this well orchestrated multimodal performance unit, two hands produce two individual gestural signs whose functional relation turns out to be of particular interest. While explaining the basics of noun morphology, the teacher complements the verbal part of his utterance *as speakers of English you know that ... teacher consists of tech- and -er* by making use of both of his hands with the palms turned upwards and the fingers curled in. On the mention of *teach-* he brings up his left hand, and immediately thereafter, on the mention of *-er*, the right hand. He then keeps holding the two hands apart as depicted in Fig. 47.4. This gesture can be interpreted in several ways. If we assume the left hand to represent the morpheme *teach-* and the right hand the morpheme *-er*, we can say that each sign itself entails a reification in that an abstract linguistic unit or a speech sound is construed as a physical object through a metaphorical projection (e.g., IDEAS ARE OBJECTS). If we assume the hands to be enclosing small imaginary items, we can suppose an outer contiguity relation between the perceivable gestural articulators and the metaphorically construed objects inside of them (cf. section 5.3). The visually inaccessible contents would then be metonymically inferred from the perceptible closed containers. In both readings, this composite gesture puts into relief the boundary between the two elements, while accentuating the fact that the linguistic units referred to in speech are connected on a conceptual level. As such, it constitutes a gestural diagram: icons, “which represent the relations, mainly dyadic, (...) of the parts of one thing by analogous relations in their own parts, are diagrams” (Peirce 1960: 157; § 2.277). The diagrammatic character of this cognitive-semiotic structure allows us to identify contiguity relations between its constitutive parts: there is thus external metonymy holding between individual signs building a structured whole (cf. Tab. 47.1: to account for the hybrid status of the diagram, it is positioned closer to the middle of the iconicity-indexicality continuum than image icon and metaphor icon; cf. Mittelberg [2006: 117–132; 2008: 134–139] for diagrammatic iconicity in gesture; cf. Waugh [1994] for iconicity in language).

METAPHOR ICON (PERSONIFICATION; REIFICATION; ETC.). Due to the metaphoricity characterizing the meta-grammatical gestures analyzed here, the previously discussed examples of image icons could, in principle, also be analyzed as metaphor icons: the semantic role *recipient* personified by the speaker’s bodily posture (cf. Fig. 47.1) and the sentence conveyed as *a string of words* reified in the form of an imaginary line (cf. Fig. 47.3). However, the present framework differentiates such gestural image icons of metaphoric linguistic expressions from cases of metaphor iconicity in gesture that imply additional semantic leaps in establishing similarity (Coulson 2001), that is, leaps not cued by metaphorical expressions in the speech modality. In the sequence of interest here, the speaker explains the difference between main verbs and auxiliaries (Fig. 47.5). While saying there is ... *what’s called the main verb*, he directs his right hand toward the blackboard behind him, thus disambiguating and contextualizing the deictic existential expression *there is* (cf. section 5.3). Immediately thereafter, while holding the deictic gesture, the speaker makes a gesture with his left hand on the mention of the *main verb*: the cupped palm-up open hand imitates the form of a small round container. Showing a strongly iconic Ground, the formal features of the cupped hand are

motivated by internal metonymy in that they portray some of the essential structural characteristics of a generic, small round container. This iconic form, however, does not directly represent the idea of a *main verb* mentioned in speech.



Fig. 47.5: *There is (index away from body) ... the main verb (metaphor icon)*

Since it constitutes a concrete, perceivable image of an abstract grammatical category, this gesture can be regarded as instantiating not only the image schema OBJECT or CONTAINER, but also the metaphor CATEGORIES ARE CONTAINERS OF CONCEPTUAL STRUCTURE IS PHYSICAL STRUCTURE (cf. Sweetser 1998). Put in Peircean terms, the cupped hand represents “a parallelism” (1960: 157; §2.277) between a category and a cup-like container (i.e. here the hand is the category container). In contrast to the personified recipient and the string-like gesture, the linguistic expression *the main verb* is non-figurative, and its meaning would be difficult to represent iconically. Again, the point here is that the container-like gesture adds another metaphoric dimension to this multimodally performed explanation, thus evidencing the speaker’s implicit metaphorical understanding of the *main verb* as a physical entity which can take the form of a container. Cross-modally achieved processes of meaning construction like this can also be identified inside the gestural diagram of the word *teach-er* discussed above (cf. Fig. 47.4). Although the source domain of the primary metaphor IDEAS ARE OBJECTS is not expressed linguistically, the closed hands function as physical entities that stand in for *teach-* and *-er*. In these metaphor icons, metaphorical understandings of basic linguistic units and categories are expressed monomodally (see Müller and Cienki 2009 on multimodal metaphor). Because the source domains of the underlying metaphors only manifest themselves in the gestural modality, these gestures are particularly good examples of the spontaneous *exbodiment* of conceptual structure.

5.3. External metonymy in gestures with predominantly indexical Ground

Generally speaking, there are outer contiguity relations between gesticulating hands and the virtual objects they seem to manipulate, as well as between hands and the adjacent space they demarcate. Based on outer contiguity relations such as contact, impact or cause/effect, external metonymy may account for finger/hand movements and visible traces or other kinds of imprints left on paper, blackboards, canvas, as well as other

surfaces such as sand or other types of grounds (e.g., the famous example of animal footprints). In a similar fashion, external metonymy accounts for the relation between gestural movements and the emerging virtual traces they create in the air. Taking the human body as the starting point, the following discussion of different types of outer contiguity relations in gesture entails different degrees of “metonymic proximity” (Jakobson and Pomorska 1983: 134) and an increasingly noticeable interaction with iconic modes.

INDEX AWAY FROM BODY (POINTING). Pointing is a highly coordinated and culturally shaped activity (e.g., Fricke 2007; Haviland 2000; Kendon 2004; Kita 2003; McNeill 1992). While they are not treated in depth here, pointing gestures are included in the taxonomy as examples of signs with a highly indexical Ground. For example, the deictic gesture shown above in Fig. 47.5 creates an invisible vector pointing away from the speaker’s body and directing the audience’s attention to the word *taught* written on the blackboard behind him. There is an outer contiguity relation between the tip of the pointing finger and the target of the pointing action. Instances of deictic gestures pointing to more distant Objects also belong to this group of indices.

BODY PART INDEX (LOCATIONS ON BODY). This kind of external metonymy is represented by gestures whose meaning derives partly from their contact with, or proximity to, a particular body part of the speaker. The gesture depicted in Fig. 47.6 below is a both-handed body part index co-occurring with the word *knowledge* in the verbal utterance *Grammar emerges from language use, not from knowledge becoming automatized*. It can be described as a hybrid of a) two simultaneously produced pointing gestures, targeting each of the speaker’s temples, and b) a bimanual gesture consisting of two cupped hands jointly constituting a metaphor icon of a container held next to the head. In order to get to the site of *knowledge*, it takes two steps along an inferential pathway, both of them afforded through external metonymy. First, there is an outer contiguity relation between the hands and the head; then, there is another outer contiguity relation between the outside of the head and its inside. In cognitive semantic terms: the head is metaphorically understood as a **CONTAINER** which stands metonymically for its content, i.e. *knowledge* (see Panther and Thornburg 2004 on metonymy and pragmatic inferencing in language, and Dudis 2004 on body partitioning in American Sign Language).



Fig. 47.6: *Knowledge* (body part index)



Fig. 47.7: *Noun* (hand/object index; support)

HAND/OBJECT INDEX (SUPPORT; CONTAINER). In gestures involving open or closed hands, outer contiguity relations may hold between the hands and the (imagined) objects they seem to be supporting, holding, placing, or otherwise manipulating. Hence, these gestural signs imply “immediate contiguity” between the gestural articulators and the implied elements of the sign process (Jakobson and Pomorska 1983: 134). One of the palm-up open hand gestures presented in the opening section of this article is reproduced here (cf. Fig. 47.7) to highlight its particular form and function in relation to the other gestures with indexical Ground discussed in this section. The principle of external metonymy is instantiated through an outer contiguity relation (contact/adjacency) between the surface of the open hand and the *noun* the speaker is referring to in speech (i.e., the speech does not hint at an action of supporting something or the idea of a surface as such). Depending on the concurrent speech, open cupped hands like the one shown in Fig. 47.5 above (*the main verb*) can also be employed to draw attention to (imagined) contents of it. Profiling the inside of an open hand would require some deictic element in the discourse-pragmatic context leading to the things inside, e.g. a demonstrative pronoun or adjective, the speaker’s gaze directed at it, his other hand pointing at the inside of the hand, or any combination of the above. In any event, external metonymy can draw on such outer contiguity relations and create an inferential pathway between cupped hands and possible contents (CONTAINER FOR CONTENT). Via outer contiguity, closed hands, too, may metonymically stand for what they seem to be enclosing (cf. Fig. 47.4). Now, especially in the case of open hand gestures (Müller 2004), virtual objects generally do not receive much geometric specification. One reason might be that the multimodal discourse is about abstract concepts and categories. Since that which the imaginary objects stand for is revealed in the concurrent speech, it might be sufficient to simply provide a surface for them, point to their existence or, if relevant, to their position in relation to other signs in gesture space (cf. Mittelberg 2010b: 376–378). It is the indexical Ground of these manual signs that propels, together with other discourse-pragmatic factors, a sort of muted function of pointing or indicating (see Liddell 2003 on locations and surrogates in American Sign Language).

HAND/OBJECT INDEX 2-SIDED (BOUNDED SPACE). We now turn to gestures with indexical Ground that provide more iconic cues regarding the geometry of the imaginary object they seem to be holding or of the chunk of space they demarcate. These gestural signs also involve “immediate contiguity” between the gestural articulators and the invisible

elements of the sign process (Jakobson and Pomorska 1983: 134). Compared to palm-up open hand gestures, the gestures depicted below (cf. Figs. 47.8 and 47.9) employ two articulators, e.g. two fingers or two hands, which help specify to a higher degree the size and shape of the objects involved in the imitative actions. The person shown in Fig. 47.8 below is lecturing about sentence structure. When explaining the short sentence *Diana fell*, his right hand shows this hand configuration held relatively high up in gesture space on the mention of the verb form *fell*. Between his thumb and index finger, he seems to be holding the verb *fell*, conceptualized as a tangible object or space extending between the articulators. If we only considered the visible gestural articulators as the semiotic material of this gesture, it would seem impossible to establish a similarity relationship between this particular hand configuration and a verb form or speech sound *fell* (no falling event is iconically depicted, either). However, through the pragmatic context and the simultaneously uttered word *fell* attention is drawn to the imaginary entity between the two fingers. So it is not the iconic relationship between the imitated action and the real action of holding something up in the air that gets profiled here; rather, the cognitive-semiotic principle of relevance is the outer contiguity relation (contact/adjacency) between the observable gestural articulators and the imagined word form that becomes, due to the linguistic cue *fell*, operationalized through external metonymy (see Hassemer et al. 2011 for a detailed account of the profiling of gesture form features).



Fig. 47.8: Verb form *fell* (hand/object index 2-sided)



Fig. 47.9: *Subcategory* (hand/object index 2-sided)

The last example is a two-handed gesture combining indexical and iconic modes in a relatively balanced fashion. In the sequence from which the image in Fig. 47.9 is taken, the speaker talks about the functional difference between main verbs and auxiliaries. He explains that auxiliaries such as *have*, *will*, *being*, and *been* (...) *must all belong to some subcategory*. Upon *some subcategory* he makes the gesture shown above, consisting of two hands that seem to be holding an imaginary three-dimensional volume whose geometry is comparatively well designated. While there is an iconic relationship (via internal metonymy) between the physical action of holding or placing an object as such and this gestural action of pretending to do so, it is again the outer contiguity relation between the hands and the adjacent imagined object that is profiled here via external metonymy in conjunction with the linguistic cue *some subcategory*. This association works effortlessly because the action of “holding” and the object being “held” are part of the same experiential domain (cf. Dancygier and Sweetser 2005 on frame metonymy). Moreover, the meaning of the term *subcategory* is reinforced by the gesture’s comparatively low location in gesture space. Since the *subcategory* is literally placed underneath the location where the superordinate category it relates to was produced only a few utterances earlier (i.e. *the main verb*; cf. Fig. 47.5), this gesture also is an instance of metonymy of place.

HAND/TRACE INDEX (PATH; LINE FIGURE; ETC.). Communicative hand movements leave invisible traces in gesture space. These traces become meaningful when attention is drawn to, for instance, their execution in terms of the trajectory they project, the shape contours they delineate, or the specific manner of movement they exhibit (e.g., through straight or wavy lines; see Bressen this volume). In such sign processes, hand/trace indices highlight the outer contiguity relation between perceivable gestural articulators, e.g. the index finger or the entire hand, and the imaginary lines or figures they leave in the air or the visible traces they imprint on surfaces. Such figurations constitute, however sketchy or minimal they may be, signs in their own right and may as such be iconic, diagrammatic, and/or metaphoric icons of something else (e.g., the line representing a string of words in Fig. 47.3; see Mittelberg 2010a for additional movement patterns). Given their strong interaction with iconic principles, this type of index is placed towards the middle of the continuum in Tab. 47.1. Outer (tactile) contiguity relations between flat hands and the surfaces they pretend to be exploring, as well as between bent hands and the volumes they seem to be touching or creating (external to the hands), represent another indexical relation that may engender iconic figurations: instantiations of HAND/PLANE INDEX are not exemplified here, but listed in the table below (see Hassemer et al. 2011 for dimensions of gesture form).

5.4. Icon and index in concert: Cross-modal grounding mechanisms in (metaphoric) cospeech gestures

Throughout this article we have seen how iconic and indexical principles jointly create form and meaning in multimodal sign processes. Functioning as a synthesis of the approach to gesture presented here, Tab. 47.1 below has two objectives: a) to give an overview of how the theoretical notions constituting the present framework are related to one another (upper half of table); and b) to present the analytical taxonomy of cognitive-semiotic principles that have been laid out in sections 5.1–5.3 and additional ones

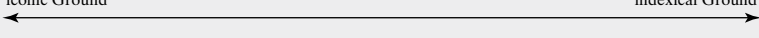
stemming from previous work (lower part of table; see Mittelberg 2006, 2010a, 2010b). Horizontally, the table is structured via a continuum spanning from an iconic pole on the left to an indexical pole on the right. Along this continuum different kinds of gestural and corporeal icons and indices are positioned, depending on whether they exhibit a predominantly iconic or indexical Ground. Gestural signs combining increased degrees of both iconicity and indexicality are placed towards the center of the continuum. Neither the taxonomy nor the placement of the gestures is to be seen as static or absolute. In a given sign process, the particular combination of pragmatic forces might require a reordering of certain principles along the continuum. There also is room for variation regarding additional gesture forms and functions not considered here (e.g., pragmatic gestures, beats and other primarily indexical gestures that fulfill various functions regarding affect, attention, interaction, and information management; e.g., Bavelas et al. 1992; Müller 1998).

Table 47.1 reads as follows. While IMAGE ICON and METAPHOR ICON are positioned closer to the left pole of the continuum, it is understood that gestural imagery may exhibit varying degrees of abstraction and schematicity along the line. As pointed out earlier, image icons tend to literally depict what is described in speech, while metaphor icons imply additional cognitive leaps. Since the DIAGRAMMATIC ICON (INTERNAL RELATIONS; STRUCTURE) entails both inner contiguity, regarding the sign-object relation, and outer contiguity relations among its constitutive parts, it is placed closer toward the indexical side of the continuum. The different gestural indices proposed here point to locations where meaning is multimodally constructed, either directly on the speaker's body or in "metonymic proximity" to it (Jakobson and Pomorska 1983: 134).

Deictic gestures with a highly indexical Ground constitute the far right of the continuum: namely, pointing gestures (INDEX AWAY FROM BODY) and pointers to specific body parts or locations on the speaker's body (BODY PART INDEX). Gestures with a slightly muted indexical Ground may indicate the existence or location of a mentally construed entity in the form of a virtual object, by providing a support structure in or on which it can be presented, e.g. via a HAND/OBJECT INDEX (SUPPORT; CONTAINER). In addition, gestures employing more than one articulator may demarcate chunks or extensions of space between them that may get semantically charged in acts of multimodal meaning-making, e.g. via a HAND/OBJECT INDEX 2-SIDED (BOUNDED SPACE). To differentiate between physical objects and tools used to perform a certain transitive action on something else, e.g. pantomiming cutting a fruit (object) with a knife (tool), another outer contiguity relation is added here. A HAND/TOOL INDEX (tool involved in action) incorporates iconic dimensions, derived from the particular hand shape or grip and the motor routine typical for the performed action (Grandhi, Joue and Mittelberg 2011, 2012). Finally, HAND/TRACE INDEX (PATH; LINE FIGURE) and HAND/PLANE INDEX (FLAT SURFACE; VOLUME) combine indexicality and iconicity in the creation of, for instance, invisible paths, line drawings, planes or volumes in gesture space (Hassemer et al. 2011 for a detailed account of the geometry and dimensions of gesture form). There is outer contiguity between fingers/hands that move through gesture space and the paths and figures they delineate, or the surfaces and volumes they seem to explore or actually create in the process. Since such invisible figurations may be iconic of something else, e.g. of cognitive or physical structures or actions, these signs are positioned closer to the iconic pole than the other indices. Regardless of the predominant Ground of the gestural signs, the metonymically inferred objects may come in different shapes

and sizes and show different degrees of iconic and geometric specification. In the gestures representing grammatical categories and linguistic structure analyzed here, smaller units such as morphemes fit into a closed hand; single words and categories were held between index and thumb or rest on a palm-up open hand; and more complex units such as sentences were represented as linear structures unfolding horizontally in front of the speaker's body (see Mittelberg 2008 and 2010a for additional examples).

Tab. 47.1: Cognitive-semiotic principles interacting in gestural and corporeal sign processes with speech

THEORETICAL BASES	C.S. Peirce	similarity	contiguity
		iconicity (image; diagram; metaphor)	indexicality
	R. Jakobson	internal metonymy inner contiguity (part-whole; part-part)	external metonymy outer contiguity (contact; adjacency; impact; place; etc.)
		metaphor	metaphor
COGNITIVE-SEMIOTIC PRINCIPLES	Gestural and corporeal sign processes (with speech)	IMAGE ICON (posture/action; object = trace, figure, hand) METAPHOR ICON (personification; reification (trace, hand)) DIAGRAMMATIC ICON (internal relations; structure)	INDEX AWAY FROM BODY (pointing) BODY PART INDEX (locations on body) HAND/OBJECT INDEX (surface; container) HAND/OBJECT INDEX 2-sided (bounded space) HAND/TOOL INDEX (tool involved in action) HAND/TRACE INDEX (path; line figure) HAND/PLANE INDEX (flat surface; volume)
	Semiotic grounding: Iconicity–indexicality continuum	iconic Ground indexical Ground 	

As metaphor is assumed to interact with all metonymic modes to varying degrees (Jakobson 1956), it is placed on both sides of the continuum. In their investigations of how indexical and iconic principles interact in the interpretation of metaphoric gestures, Mittelberg and Waugh, in their (2009) article “Metonymy first, metaphor second”, have suggested two distinct but intertwined mappings. From the perspective of the person listening to and looking at such a multimodal performance, metonymy can be said to lead into metaphor. First, gestural sign vehicles, i.e. hand shapes and movements, may serve as visual reference points (Langacker 1993) triggering cognitive access to concepts represented as chunks of demarcated space or invisible objects (e.g., P. Wilcox 2004). Via a metaphorical mapping, these reified entities stand for the abstract categories the person talks about (see Taub 2001 for metaphorical mappings in American Sign Language). In some of the instances examined here, the concurrent speech is not metaphorical in nature (e.g., *teach-er*; *main verb*). Yet, the body portrays, i.e. exbodies, how the person conceptualizes and understands the abstracta.

Such instances of gestural manifestations of both mental imagery and physical actions seem to be cross-modally grounded in several interlaced ways: a) via the human body indexically anchored in its momentary temporal, spatial and social context; b) via the concurrent linguistic utterance carrying the information that determines

the local meaning of a potentially polysemous gestural/corporeal sign, which c) is further contextualized via previous and subsequent gestures (see Müller 2010 for analyses of gesture sequences). In light of these processes, we witness a tendency to create – out of nothing – material anchors for abstract ideas and structures in the immediate, visible and evolving environment sharable by the interlocutors (e.g., Hutchins 1995; Williams 2008).

6. On the semiotic reality of image schemata and force gestalts in gesture

Image schemata and force dynamics occupy a central place in embodied approaches to meaning (cf. Johnson 1987, 2007; Talmy 1988, 2000). When applying Johnson's (1987: xiv) original definition of image schemata as "recurring, dynamic patterns of our perceptual interactions and motor programs that give coherence and structure to our experience" to gesture, it becomes evident that gestures are prone to offer additional support for the "semiotic reality" of such experiential gestalts (Danaher 1998: 190). Recent work on image schemata in language comprises a variety of understandings and definitions (e.g., Hampe 2005), but generally the idea of embodiment seems to be understood more and more literally (see Zlatev 2005 on mimetic schemas in children's gestures). As the gesture research reviewed in this article suggests, studying the human body's intuitive expressions and culturally-shaped practices may provide valuable insights into how higher cognitive activities may be grounded in dynamic patterns of visual perception, bodily motion, and social behavior. According to Cienki (2005: 435), "image schemas are readily available, indeed 'on hand,' for recruitment as gestural forms". An example of a pervasive image schema is the path schema consisting of a beginning (SOURCE), an end point (goal), and a vector constituting a path between source and goal. The PATH schema may also structure gestural representations of a sentence as an imaginary line traced horizontally from left to right in front of the speaker (cf. Mittelberg 2008). Image schemata have further been argued to be a means to project conceptual structure into gesture space, thus underpinning the flexible spatialization of abstract concepts as well as systematic uses of certain regions of gesture space (e.g., UP/DOWN; LEFT/RIGHT; FRONT/BACK; CENTER/PERIPHERY; e.g., Calbris 2003; Cienki 1998b, 2005; Evola 2010; Mittelberg 2010a, 2010b; Williams 2008). Moreover, image schemata may build the basis for variants of a recurrent gesture: for example, the cycle schema has been shown to underlie variants of the cyclic gesture which may evoke processes of searching, describing, or calling on addressees (e.g., Ladewig 2010, 2011; cf. also Müller 2010 on recurrent gestures).

Independently of the medium in which they materialize, image schemata, assumed to be dynamic and malleable conceptual gestalts, are rarely fully instantiated. In gesture, too, salient structural properties of a posture, a motion pattern, a hand configuration, or an ephemeral figuration in space may provide only minimal information that may feed into the evocation of the full schemata or gestalts. It is left to the eye of the addressees and to their own experience with physical actions and thought processes to complement kinesthetic and cognitive entailments. Among the prominent hand configurations and motions patterns that emerged from the corpus of linguistics lectures, a large number were found to be reminiscent of image-schematic structures and basic geometric shapes. The following schemata, some of which also resulted from the analyses presented in this

article, have been identified: OBJECT; CONTAINMENT; SUPPORT; CONTACT; SOURCE-PATH-GOAL; LINK; SCALE; EXTENSION; BALANCE; CENTER-PERIPHERY; CYCLE; ITERATION; FRONT-BACK; ADJACENCY; PART-WHOLE; FORCE (Mittelberg 2010b: 374). In addition, the analysis revealed a set of geometric patterns (e.g., circle, semicircle, triangle, rectangle, and square), as well as lines traced along the horizontal, vertical, diagonal, or sagittal axis, thereby showing various qualities such as straightness and curviness (see Cienki 1998b on the image schema STRAIGHT). Several schemata may further interact in a given multimodal expression, as evidenced by the gestural diagram representing the morphological structure of the noun *teach-er* (Fig. 47.4): OBJECT, CONTAINMENT, LINK, PART-WHOLE, SPLITTING, and BALANCE jointly engender a complex cross-modally achieved explanation of abstract relations. Given the visuo-spatial mediality of gestures, the list above comprises, perhaps not too surprisingly, various spatial and spatial relations image schemata which are assumed to structure systems of spatial relations cross-linguistically (Lakoff and Johnson 1999: 35).

As highlighted throughout the article, the present approach to gesture puts into relief the importance of contiguity relations, not only among elements within an object, event or domain, but also regarding the mechanisms that ground individual sign processes in their physical, conceptual, and semiotic contexts. What is crucial here is that conceptual structures with an internal structure such as diagrams, frames (Fillmore 1982), and image schemata (e.g., the path schema and other relational schemas) also exhibit contiguity relations between the parts they consist of. As Johnson (1987: 126; italics in the original) emphasized, “image schematic structures whose relations make up the fabric of our experience [are] *pervasive, well-defined and full of sufficient internal structure to constrain our understanding and reasoning.*” It is this internal structure that allows the language user/gesturer to profile one part of a structured whole, e.g. the beginning or the end of an itinerary (or a love relationship; Lakoff and Johnson 1980), while other parts remain backgrounded but can still be inferred (cf. the diagram of morphological structure discussed in section 5.3; Fig. 47.4). At this point, we can make a link back to metonymy, for the schemata PART-WHOLE, LINK, CONTACT, and ADJACENCY correspond to the central inner and outer contiguity relations identified in the gestures discussed throughout this article. Via verbally triggered processes of metonymic inferencing, these contiguity relations may become operationalized, resulting, for instance, in shifts of attention from a visible hand performing a gestural action to the inferred object, tool, or figuration that is to be imagined as existing or evolving adjacent to the gesturing hands. This is in part afforded by the principle of “immediate contiguity” (Jakobson and Pomorska 1983: 134) between the gesturing hands and the implied elements. Despite their immaterial nature, these imaginary dimensions of gestural signs are meaningful elements in the multimodal sign process of interest here.

Force-dynamic experiential gestalts (e.g., Johnson 1987; Talmy 1988) are also pertinent to the study of gesture and bodily communication more broadly; yet, they are only starting to receive attention in gesture research. Johnson (1987: 42; italics in the original) reminds us that “our bodies are clusters of forces and that *every* event of which we are a part consists, minimally, of forces in interaction”. Bodily routines of interaction with the environment that may motivate multimodal expression may imply, *inter alia*, exerting force on objects or people, such as pulling or pushing something or somebody, as well as forces felt on one’s own body such as GRAVITY, BLOCKAGE, COMPULSION OR REPULSION. Physical activities such as walking against the wind, carrying

heavy items, keeping balanced while riding a bike, or being pushed through a narrow hallway by a crowd of people, can be easily reenacted through imitative actions performed with the full body or parts of it, such as the head, torso and/or hand gestures. In the meta-grammatical gesture corpus, certain gestures portrayed the behavior of grammatical categories and the dynamic nature of cognitive and syntactic operations via movements exhibiting an increased level of energy (Mittelberg 2010a: 370). For instance, the idea that the theory of emergent grammar views grammar and language as merging domains (Johnson 1987: 126) was illustrated by a comparably forceful movement. The bimanual gesture in question starts out with two hands held apart, palms facing each other. On the mention of *it blurs the boundary between learning and doing*, the palms are suddenly pushed towards each other. In this vivid portrayal, a forcefully performed bodily action seems to erase both physical and conceptual boundaries at the same time. Generally speaking, gesture research promises to augment our understanding of the bodily logic of force schemata, especially regarding the multimodal expression, i.e. exbodiment, of less tangible, yet crucial dimensions of meaning such as social forces and attitudes, but also affective and intersubjective dimensions of human communicative behavior (Johnson 2005, 2007).

7. Concluding remarks

In gesture studies, the “bodily basis of meaning, imagination and reason” (the subtitle of Johnson’s 1987 book) indeed is the starting point for examining the physical and culturally shaped forces that lend a certain degree of systematicity to less-consciously produced bodily signs. In the same vein, the intent of this article has been to demonstrate how certain cognitive-semiotic principles – such as iconicity, indexicality, metaphor and metonymy – interact in motivating physically grounded processes of gestural form creation and interpretation. Inspired by Peircean and Jakobsonian notions, an iconicity-indexicality continuum was suggested, allowing to relate gestural signs with predominantly iconic or indexical Grounds, as well as more transient cases to one another (cf. the taxonomy of icons and indices presented in Tab. 47.1). The idea of the *exbodied mind* was put forth to focus on how structures of embodied multisensory experience, such as image schemata and force gestalts, may visibly manifest themselves, at least to certain degrees, in the form of dynamic ephemeral gestural and corporeal signs produced with speech.

The analyses presented above have shown once again that gesture analyses need to carefully consider a host of contextual factors, particularly speech and neighboring gestures (Müller 2010), not only to disambiguate potentially polysemous gestural forms, but also to determine which parts and movements of the bodily articulators become profiled and thus meaningful in a given moment (Hassemer et al. 2011). In these multimodal performances, the speech content further proved to be instrumental in establishing whether the corporeal actions or hand configurations themselves are focused upon, or whether the imaginary entities, spaces or lines immediately contiguous to, or created by, the gesturing hands become the salient elements in such processes of cross-modal meaning construction. In this and many other respects, gesture studies can no doubt greatly benefit from systematic comparisons with the morphology and discourse pragmatics of signed languages (see, e.g., Dancygier and Sweetser 2012; Dudis 2004; Liddell 2003; Taub 2001; P. Wilcox 2004; S. Wilcox 2004).

In light of Johnson's (2005: 31) suggestion to "analyze various additional strata of meaning, such as the social and affective dimensions, to flesh out the full story of meaning and thought", bodily semiotics seems to bear a particularly high potential to continue to contribute to a fuller understanding of the imaginative, intersubjective and felt qualities of meaningful experience and expression.

Acknowledgements

The research presented in this article was supported by the Excellence Initiative of the German Federal and State Governments. The author wishes to thank the editors, as well as Vito Evola, Julius Hassemer and Gina Joue for valuable feedback and Yoriko Dixon for the gesture drawings.

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