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Chapter 14

Metonymy first, metaphor second: A cognitive-semiotic approach to multimodal figures of thought in co-speech gesture

Irene Mittelberg and Linda R. Waugh

Abstract

Based on spoken academic discourse and its accompanying gestures, this chapter presents a cognitive-semiotic approach to multimodal communication that assigns equal importance to metaphor and metonymy. Combining traditional semiotics with contemporary cognitivist theories, we demonstrate how these two figures of thought jointly structure multimodal representations of grammatical concepts and structures. We discuss Jakobson's view of metaphor and metonymy, and particularly his distinction between internal and external metonymy, thus discerning various principles of sign constitution and indirect reference within metaphoric gestures (whether or not the concurrent speech is metaphorical). We then introduce a dynamic two-step interpretative model suggesting that metonymy leads the way into metaphor: in order to infer the imaginary objects or traces that gesturing hands seem to hold or draw in the air, a metonymic mapping between hand (source) and imaginary object (target) is a prerequisite for the metaphorical mapping between that very object (source) and the abstract idea (target) it represents.

Keywords: metaphor, metonymy, gesture, semiotics, cognitive theory

1. Introduction

Work done by scholars in many disciplines has shown that metaphor and metonymy rely on general cognitive processes of conceptualization and association that may materialize in modalities other than spoken and written words, e.g., in gesture. While the chapters in this volume contribute to a unified approach to the role of metaphor in multimodal representations, we will show here that it is both metaphor and metonymy that, by working together in multimodal communication, function to convey complex meanings,

just as they motivate, to various degrees, all processes of signification (Jakobson 1990 [1956]). Thus, we agree with many other scholars that more attention should be paid to metonymy: it is equal in importance to metaphor but crucially different from it in its contribution to communication (e.g., Barcelona 2000; Croft 1993; Dirven and Pörrings 2002; Gibbs 1994; Goossens et al. 1995; Lakoff 1987; Panther and Radden 1999; Panther and Thornburg 2003; Turner and Fauconnier 2002; Wilcox 2004).

We will show this by focusing on a multimodal combination of verbal and bodily communication – namely, spoken academic discourse and accompanying manual gestures (see also Müller and Cienki, this volume). The discourse here is classroom lectures by linguists about grammar and syntactic theory and, as we will demonstrate, both metaphor and metonymy play a crucial role in presenting these abstract phenomena. Multimodal representations of knowledge domains such as grammar have a long-standing tradition and visual metaphor, in particular, has widely been used to illustrate linguistic explanations (see Mittelberg 2002 on Early Modern printed images of grammar). Besides figurative language, pictorial metaphor has been studied as a way of expressing an analogy between two entities (e.g., Carroll 1994; Forceville 1994, 1996, 2002, 2005; Kennedy 1982). However, if we compare gesture to solid sculptures or pictorial signs, we realize that, just as speech in the auditory domain is inherently dynamic and fleeting, so with gestures the interplay of time, space, and motion typically engenders transient rather than lasting images that have to be understood quickly in time. This difference is crucial for an understanding of gesture.

In the gestural representations of grammar we will investigate here, the hands and arms serve as a resource for making meaning as they correlate with the on-going speech through co-speech gestures (McNeill 2005). Cognitive linguists have provided a detailed picture of the different ways in which the human body serves as a (re)source for a large array of metaphors (e.g., Kövecses 2002; Lakoff and Johnson 1980, 1999). We are primarily interested here in the ways in which the gesture modality generally can provide insights into situated cognition because it helps to externalize concepts, structures and practices through the use of both space and the *body* – thereby creating an “ex-bodiment” of these concepts and structures through motor actions and other forms of interaction with the physical and social environment (Mittelberg 2006). Thus, this work rests on the premise that concepts (and other aspects of conceptual structure such as image schemata) are embodied and are themselves multimodal, including kinesthetic features (Hampe 2005; Johnson 1987; Lakoff 1987; Lakoff and Johnson 1980, 1999; Sweetser 1990, 1998). One of our aims here is to present ways in which co-

speech gesture provides additional evidence for conceptual metaphor and metonymy by revealing in a dynamic fashion dimensions of schemata not necessarily expressed in the concurrent speech (Calbris 2003; Cienki 1998, 2005; Cienki and Müller 2008; McNeill 1992, 2005; Mittelberg 2008; Müller 1998, 2008; Sweetser 1998, 2007; Taub 2001). Another is to show that some of the claims about the relationship between source and target domains made on the basis of multimodal representations without gestures fail to account for gestures satisfactorily, since the metaphorical meaning-making processes cannot be elucidated without taking into consideration how they interact with metonymic modes. We will also show that metonymy assumes distinct functions regarding, for instance, gestural sign constitution through synecdoche and indirect reference, as others have suggested (see Bouvet 2001; Gibbs 1994; Müller 1998; Wilcox 2004; Wilcox and Morford 2007).

Building on these considerations, we present an approach to multimodal communication, and in particular to multimodal metaphor and metonymy, that has been shaped by both theoretical motivations and by the nature of our data. Our approach combines contemporary cognitivist theories (Gibbs 1994, 1999; Johnson 1987; Lakoff 1987, 1993; Lakoff and Johnson 1980, 1999; Sweetser 1990) with the older but still relevant work of C. S. Peirce (1960, 1991, 1992, 1998) and Roman Jakobson (1956, 1987a, b, 1990; Jakobson and Pomorska 1983). The Jakobsonian and Peircean semiotic approaches continue to provide rich perspectives for multimodal research and lend themselves to being applied to gesture, for they are broader in scope than linguistic theories and have been used to analyze a wide variety of dynamic, discursive phenomena such as theatre, cinema, myths, rituals, music, poetry, etc. Since we have treated in detail elsewhere Peirce's theory (Waugh 1992, 1998; Waugh et al. 2004) and Peircean perspectives on the gestural sign (Mittelberg 2006, 2008; see also Fricke 2007; McNeill 1992), our focus here will be on Jakobson's approach and its relevance for gesture research from a cognitivist perspective.

Our rationale for combining these theoretical perspectives rests on the fact, firstly, that Cognitive Metaphor Theory (CMT) and Peirce's semiotic share central assumptions about the link between image-schematic structures and metaphorical (and diagrammatic) projections, as well as about habitual patterns of experience and interpretation (Danaher 1998; Hiraga 1994, 2005; Mittelberg 2006, 2008). Second, Jakobson emphasized the importance of metaphor and metonymy as different semiotic and cognitive strategies that structure both verbal and non-verbal signs and messages (Jakobson 1956, 1987a, b; Lodge 1977; Waugh 1998, 2000; Waugh and Monville-Burston

1990; Waugh et al. 2004). Thirdly, both Jakobson and Peirce stress the point of view of the interpreter of a given message: in similar fashion, our aim will be to explicate how gestures are interpreted by the viewer (e.g., the student, the gesture analyst) through both metaphor and metonymy.

2. Characterizing the data: Semiotic idiosyncrasies of metalinguistic discourse and its accompanying gestures

Connecting the body, language, cognition, society and culture, gestures can provide a window into thought processes and their pragmatic and ecological anchorage (Goodwin 2003; Ochs et al. 1996; Streeck 2002). From a cognitive viewpoint, i.e., taking the perspective of the speaker, research has shown how hands (and arms) may reveal, consciously or unconsciously, thoughts and attitudes that speech might conceal (McNeill 1992: 246). We, on the other hand, are trying to see how the gestures help the viewer to understand the conceptualization of abstract ideas that the speaker/gesturer is communicating.

The spontaneous gestures we will be analyzing here are not part of an elaborated sign system but are created by the speaker as he/she speaks, and thus gesture and speech can produce very different effects, including juncture or disjuncture, redundancy, complementation, or mismatch (Goldin-Meadow 2003; McNeill 2000, 2005). A gesture may disambiguate linguistic information and thus make meaning more precise (for instance, by pointing at a concrete referent that is linguistically only referred to via an unspecified pronoun), or it may add components of meaning not expressed in the speech it accompanies (Kendon 2000).¹ Often, however, spontaneous gestural signs tend to be polysemous and need a contextual support to be correctly interpreted; thus, discourse-pragmatic factors and concurrent speech help to disambiguate them (Calbris 1990; Kendon 2004; McNeill 2005; Müller 1998). As Jakobson noted, a pointing gesture at a package of cigarettes could be interpreted to mean "this package in particular, or a package in general, one cigarette or many, a certain brand or cigarettes in general, or, still more generally, something to smoke." The viewer does not know if the pointer is "simply showing, giving, selling, or prohibiting the cigarettes." The only way to know is through the accompanying speech (Jakobson 1953: 567). A single gesture could also fulfill several functions at once: e.g., from representational to deictic, or from accentuating the rhythm of the speech to attracting attention and managing interaction between the interlocutors. Gestures are thus visuo-spatial "motor signs" (Jakobson 1987a: 474) that derive their

locally-situated meaning from the very human body that articulates them, the speech they accompany, and the socio-cultural and material environment the person interacts with. Consequently, a gestural sign does not exist, and cannot be analyzed, detached from either the human body or the here and now of the speech event (the *origo* in Bühler's terms, see Fricke 2007). This means that in order to understand the gestures under discussion here, we first need to characterize the speech they accompany in terms of its genre and functions.

As indicated above, our data come from one specific spoken genre: metalinguistic academic discourse in lecture format, from a corpus of such lectures by four professors (three women and one man), all native speakers of American English, while they were teaching introductory linguistics to undergraduate and graduate students at two major American universities. The lectures were videotaped in a naturalistic setting, that is, regularly scheduled classes where neither the teacher nor the students knew about the purpose of the taping (in particular, they did not know that the analysis was to focus on gesture). Thus, the assumption is that the gestures used by the professors were not affected by the videotaping (for a detailed description of methods of collecting, editing and transcribing the data, including the coding and annotation systems used, see Mittelberg 2006, 2007). Now, in the typical classroom setting there are other visual modalities: e.g., black/green/white boards with writing and other visuals on them, handouts, slides and power point projections. However important these are for the communication of information in the classroom, what is unique to gestures is that they are conveyed by the body of the lecturer and correlated with the speech that is emanating from that same body.²

The speech that is at issue here is highly complex. It has multiple functions: it conveys information about language that reflects the beliefs of the speaker and is directed at the audience (the students in the class) with the aim that the students will gain at least an understanding of, and perhaps also a belief in, the concepts being discussed. The gestures have the same complex multifunctionality as they contribute to the communication and understanding of the lectures. Our focus will be on what Müller (1998: 110–113) calls "referential gestures," that is, gestures that depict objects, attributes of objects and people, actions, or behaviors, whether concrete or abstract (Müller 1998; see also Cienki 2005). More specifically, the gestures analyzed here are all attempts at making fairly abstract grammatical concepts and aspects of the syntactic structure of sentences more understandable for the listener/viewer, by turning them into (partial) visuo-spatial and embodied manifestations of these concepts.

3. Jakobson: Metaphor and metonymy (internal and external), similarity and contiguity, selection and combination

Roman Jakobson's view of metaphor and metonymy has been successfully utilized in the analysis of a wide variety of monomodal and multimodal texts (Bradford 1994; Jakobson 1956; Jakobson and Pomorska 1983; Shapiro 1983; Whittock 1990) and is particularly valuable and compatible with contemporary, cognitively-oriented accounts of metaphor and metonymy since it is in fact one of their predecessors. In recent publications (e.g., Dirven and Pörrings 2002), cognitive linguists revisit and offer a great deal of evidence for Jakobson's theory. This chapter attempts to show that adopting his balanced approach and exploring the interplay of these "two different mental strategies of conceptualization" (Dirven 2002: 75) has the potential to illuminate the semiotics of gesture and of multimodal communication more generally.³

Jakobson (1956) contends that metaphor and metonymy are two different modes of association that structure both linguistic and non-linguistic signs. While until not too long ago metaphor consistently received much more scholarly attention than metonymy, Jakobson paid equal attention to both tropes. In his view, metonymy is not a sub-type of metaphor, but the two are in opposition with each other and thus create a fundamental polarity that is at the root of all symbolic processes, cultural manifestations, and human thought in general. Thus, studies concerned with metaphor ought to pay (more) attention to its interaction with metonymy, a view that is also present in the work of quite a large number of cognitive linguists.

In defining the difference between metaphor and metonymy, Jakobson was particularly inspired by Peirce's famous trichotomy of signs: icon, index and symbol. According to Peirce, *similarity* is at the root of iconic relationships between the sign and the object it represents – and he includes metaphor as a specific sub-type of icon (Peirce 1960, 1992, 1998). *Contiguity*, on the other hand, is inherent to the index, deictic categories, and, as Jakobson (1956, 1966) also emphasized, metonymy. For Jakobson, similarity and contiguity are bipolar opposites, representing the two essential structural *relations* between signs that permeate all of language (Shapiro 1983: 194). Thus, similarity is the basis for metaphor, as well as synonymy, paraphrase, antonymy, analogy, etc., and contiguity underlies metonymy, as well as spatial and temporal neighborhood (both proximity and remoteness), causal effect relations, etc. In addition, Jakobson differentiated between two major subtypes of metonymy: (1) "external metonymy" ("metonymy proper"), in which "the name of an object is replaced by the name of an attribute, or of

an entity related in some semantic way (e.g., cause and effect; instrument; source)" (Wales 2001: 252), e.g., the term "the White House" when referring to the President of the U.S. (place for person); and (2) "internal metonymy" (synecdoche), in which "the name of the referent is replaced strictly by the name of an actual part of it" (Wales 2001: 252) or by the name of the whole of which it is a part; e.g., part stands for whole and whole for part (e.g., "all hands on deck," in which "hands" stands for the whole body). That is, Jakobson integrated synecdoche as an important sub-type of metonymy, and as we will see, these two types of metonymy are crucial to the study of gesture. Most importantly, Jakobson insisted that similarity and contiguity – and metaphor and metonymy – are not mutually exclusive: just as signs can exhibit both similarity and contiguity in differing hierarchies (Jakobson 1966: 411), so the nature of a given sign is dependent on the preponderance of one of the two modes over the other (see Jakobson 1956: 130).

According to Jakobson (1956: 117, see also Waugh and Monville-Burston 1990), the similarity/contiguity *relations* between signs are different from the basic types of *operations* by which any linguistic utterance is constructed by the speaker. Any act of utterance formation involves the *selection* of certain linguistic entities from the code (e.g., words) and their *combination* into linguistic units of a higher degree of complexity (e.g., phrases and sentences). Understanding by the addressee implies the reverse order of operations: the *combination* of units of greater complexity has to be dissolved into the individual linguistic entities *selected*. Both "modes of arrangement" (Jakobson 1956: 119) reflect the structural reality of language: selection relies on the organization of the linguistic system, while combination is evidenced in the fact that every sign is made up of constituent signs (sentences, words, morphemes, phonemes, features) and serves as the context for other signs. Jakobson (1956: 119) referred to this kind of semiotic contextualization as "contexture," e.g., the process by which "any linguistic unit at one and the same time serves as a context for simpler units and/or finds its own context in a more complex linguistic unit. [...] Combination and contexture are two faces of the same operation." In the case of multimodal messages, signs from more than one mode are selected and combined to constitute the contexture for one another: for example, gesture combined with speech. Such combinations may be concurrent and/or sequential: so, a given gesture is concurrent with the simultaneously occurring words, and the way in which gestures unfold in time (with or without speech) is an example of sequential combination.

4. Conceptual metaphor and metonymy in gestural representations of grammar

Offering new insights into multimodal instantiations of conceptual metaphor, previous work on metaphoric gestures has shown that they are not random, unsystematic hand movements, but exhibit recurrent forms and form-meaning mappings (Bouvet 2001; Calbris 1990, 2003; Cienki 1998, 2005; Cienki and Müller 2008; McNeill 1992, 2005; Mittelberg 2006, 2008; Müller 1998, 2008; Nuñez and Sweetser 2006; Parrill and Sweetser 2004; Sweetser 1998; Webb 1996). For each metaphorical meaning construal, it is necessary to determine locally whether the underlying metaphor is materialized in the speech and/or in the manual modality and how the relationship of source and target domains can be defined. For example, language and gesture do not necessarily exhibit the same metaphorical understanding, and gesture and speech may be motivated by different but compatible metaphors (see also Cienki and Müller 2008; Müller and Cienki this volume). Moreover, gesture may reveal metaphorical understandings even if the concurrent discourse is non-metaphorical (Mittelberg 2008; Müller 2003, 2008). These observations attest to the importance of gesture as a rich data source in cognitive linguistics in general (Sweetser 2007) and for embodiment theory in particular (Gibbs 1994, 2003, 2006; Lakoff and Johnson 1999; Taub 2001).

Much less work has been done on metonymy in gesture. The objective of this section is two-fold. First, we will show that the interpretation of the gestures in our corpus is anchored in metonymy. In referring to an abstract notion, for instance, a metaphorical gesture relies on metonymic principles of sign formation: for example, via synecdoche, the hands may depict only the locally essential elements (parts) of the object or action (whole) in question (cf. Bouvet 2001; Mittelberg 2006; Müller 1998). Secondly, we suggest that due to its spontaneous and ephemeral nature co-speech gesture allows insights into the dynamics of figurative thought, and our analysis contributes to existing views of the definition of multimodal metaphor and the relationship between, e.g., source and target domain (for implications regarding static versus moving images, see Forceville 2003, 2005, 2006/this volume).

4.1 Non-metaphorical discourse and *ad-hoc* metaphorical visualizations in gesture

As indicated earlier, spontaneous referential gestures tend to be polysemous and often need contextual support to be correctly interpreted; for example,

one and the same gestural form may potentially refer to either a concrete or an abstract entity. Depicting via metonymy contextually pertinent features of objects or actions, referential gestures may either portray predominantly iconic sign-object relationships (representing concrete objects or movements), or they may rely on metaphorical sign-object relationships (involving abstract entities) and thus call forth a metaphorical interpretation. For example, a gesture with two hands may trace the frame of a painting or the frame of a theory. In both interpretations, the gesture is synecdochic since it provides only some aspects of the frame by rendering the parts that are pragmatically salient in the given discourse context. When used non-metaphorically, the synecdochic gesture can be interpreted as referring to a spatial, physical structure (e.g., the essential panels of the frame itself, not the other elements that hold the painting in place). In the case of a metaphorical interpretation, the synecdochic gesture further represents, in Peirce's (1960: 157) terms, some sort of *parallelism* – or similarity – between the form and function of a physical frame and the form and function of an abstract frame structure (Köller 1975). Adopting a cognitivist perspective, we can say that the gesture is interpreted with respect to the metaphorical concepts IDEAS ARE OBJECTS and CONCEPTUAL STRUCTURE IS GEOMETRIC PHYSICAL STRUCTURE (Lakoff and Johnson 1980; Sweetser 1998). Stated in McNeill's (1992) terms, such images of abstract ideas (originally called *metaphorics*) represent both source and target domain information (in this example, the gesture would be regarded as representing both the conceptual frame and the physical frame). However, as we will see, the metaphorical gestures we will be discussing here are not directly iconic of the concrete source domain they involve. In fact, what is common to all of the metaphorical interpretations is that they rest on a first interpretation of the gesture through metonymy: e.g., the traces in the air have to be interpreted as meaning a frame of some sort; only then can the metaphorically-motivated object be accessed.

Let us look at some examples from the data to determine how metaphor and metonymy are manifested in gesture and how source and target domains play out in the two modalities. The gesture represented in figure 1 is an example of a frequently occurring form that has several potential interpretations. Looking simply at the morphology of the gesture, we see that it consists of two, relatively relaxed, open hands held fairly far apart with palms facing each other (the right hand is partly closed because it contains a piece of chalk). If the speaker was referring linguistically to the length of a physical object such as a large box, the gesture would receive a concrete interpretation through metonymy, as if the speaker were holding an elongated object

like a box between his hands. However, in this case, the speaker is referring to a sentence and represents the sentence metonymically by the hands, which are assumed to be marking the beginning and end of its projection in space. The sentence is conceptualized metaphorically as bounded space or a large, elongated object. Thus, the gesture may be said to reflect some basic metaphorical concepts proposed in the cognitive linguistic literature: e.g., IDEAS ARE OBJECTS; CONTENTS ARE CONTAINERS; CATEGORIES ARE CONTAINERS; CONCEPTUAL STRUCTURE IS GEOMETRIC PHYSICAL STRUCTURE (Lakoff and Johnson 1980; Sweetser 1998). To get to the idea of a sentence, however, the viewer first has to take a metonymical path from the hands to the space or the imaginary object. This is a case of external metonymy, because the speaker is holding the imaginary object between his hands, which are external (i.e., adjacent) to the object. And then to get from the object (or the space extending between the hands) to the sentence, the viewer has to take a metaphorical path from the imaginary concrete entity (or space) to the abstract entity (the sentence).⁴

- (1) (sentences)
 ... Sentences, \
 G1
pvo-h bh far apart
 (..) [while they're made up of words, -
 G1 being held
 (...) aren't made up of words, \]

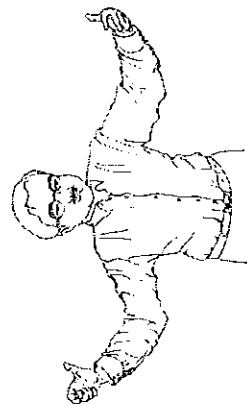


Figure 1. A sentence as an elongated object held (or space extending) between two hands

It should be noted here that while the term "sentence" is non-metaphorical, its gestural portrayal is first metonymical in nature and then interpreted metaphorically. In other words, there are *two interpretative moves* needed to get to the imaginary object: (1) the hands represent, via (external) meton-

ymy, the object held between them; (2) the object is a metaphorical representation of a "sentence" (which is a non-metaphorical linguistic expression). The imaginary object being held is metonymically inferred through the gesture itself (ACTION FOR OBJECT INVOLVED IN ACTION, Panther and Thornburg 2004). But the underlying metaphorical mapping, involving the target domains CONCEPTUAL STRUCTURE, IDEA, or CATEGORY and the source domains PHYSICAL STRUCTURE, OBJECT, or CONTAINER respectively, can only be inferred by a metaphorical interpretation of the metonymically conveyed object. Forceville suggests that "[b]y contrast to monomodal metaphors, multimodal metaphors are metaphors whose target and source are each represented exclusively or predominantly in different modes" (Forceville 2006: 384). For this example, this definition holds: the target domain ("sentence") is expressed linguistically and the source domain (object) is conveyed manually.

The gesture above recurs in the data in slight variations referring to linguistic units of different degrees of complexity (words, phrases, constituents, sentences, etc.). By contrast, single words, units below the word level, and grammatical categories such as noun and verb are often represented by a single hand, for example by an open hand with the flat palm turned upward, thus forming a surface on which to present something to the addressee (see Müller 2004 for a detailed discussion of this gesture type). According to our analysis, the gesture is interpreted metonymically to mean that there is an object on the hand, and then, through metaphor, that object is interpreted as a word, a morpheme, a noun, or a verb. In example 2 (figure 2), this open hand is combined with a closed fist. The speaker, who is talking about morphological structure, illustrates the fact that the English noun "teacher" consists of two morphemes by forming two closed fists held next to each other. His left fist seemingly contains the lexical morpheme "teach-" and his right fist, which opens up into a relaxed palm-up open hand during the demonstration, contains the grammatical morpheme "-er." Although the interpretation of the linguistic expressions relies on neither metaphor nor metonymy, the two figures of thought again are involved in a two-step process in this semiotically complex instance of indirect gestural reference. Here, however, there is no direct similarity (i.e., image iconicity) between the form of the gesture and the objects it refers to (as in the frame example discussed above). Instead, the enclosed fist is interpreted metonymically as containing, and the open hand as holding, small physical objects, e.g., LOCATION FOR OBJECT; ACTION FOR OBJECT INVOLVED IN ACTION; REPRESENTATION FOR REPRESENTED (Panther and Thornburg 2004; Wilcox 2004). Thus, the left hand serves as a CONTAINER and the right hand as a SUPPORT

structure for the imagined objects; they evoke, independently of the speech content, these two basic image schemas (cf. Johnson 1987; Mandler 1996).⁵ And in both cases, these imagined objects are metaphorically construed as being the two morphemes (IDEAS ARE OBJECTS, Lakoff and Johnson 1980).

- (2) (the teach-er)
 "...our understanding of this is as speakers of English you know
- | | | |
|------|-----|-----|
| G1.1 | 1.2 | 1.3 |
| 1.4 | 1.5 | 1.6 |
- [that the teacher] consists [of the] [and teacher (..)]
 and [teacher] [consists of 'teach'] [and 'er']
- 1.7
 [not]
- | | | | |
|-----|-----|------|------|
| 1.8 | 1.9 | 1.10 | 1.11 |
|-----|-----|------|------|
- [the teacher con]sists [of the] [and teach] [and er]."

Without going into the theoretical views regarding the differences between metaphor and metonymy currently debated in the cognitive linguistics literature, it should be noted that one of the received understandings holds that whereas metaphor is based on cross-domain mappings, metonymy consists of mappings within the same experiential domain (cf. Barcelona 2000a; see also Croft 1993; Radden 2000).⁶ In light of this domain-based definition of metonymy, we can say that both manual actions constitute common experiential domains of holding objects, and thus the gesturer can expect the viewers to easily relate to the action from their own experience and to build the basis for accessing the metaphorically construed objects. According to the two interpretative moves we introduced above, metonymy again comes first: the gestural vehicles (e.g., the hand configurations) serve as visible metonymic sources, that is, "reference points" (Langacker 1993); they point to the invisible target concepts ("teach-" and "-er," sitting in/on the hands) that are mentioned in the concurrent discourse. These are instances of external metonymy, since the imagined objects are adjacent to (contained in or sitting on), but external to, the hands. The gestural form embodies the source, thus making it perceivable and present in the immediate context and pointing to the unperceivable target. So while the associative relation between visible source and associated invisible target is based on conceptual contiguity, the abstract notions are metaphorically construed as imaginary objects. Meton-

ymy is also based on the fact that the two hands positioned somewhat near each other hold associated objects – the metaphorically inferred lexical and grammatical morphemes referred to in the speech – that together make up a word (PART FOR WHOLE, PART FOR PART, Jakobson 1956, 1963).

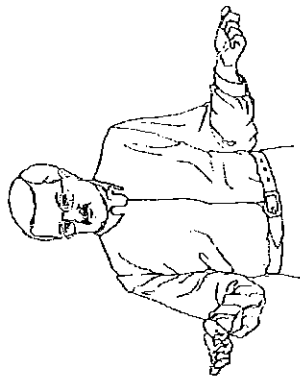


Figure 2. Morphemes as small objects on open hand or in closed fist

We are now in a position to define the relationship between source and target domains more clearly. The perceivable, manual modality triggers cognitive access to the abstract target via *two interrelated mappings* in which chunks of space extended between two hands or the imagined physical objects serve as a juncture between metonymy and metaphor. In figure 2, the *imaginary object*, presented on the right hand of the speaker, serves as *both the target of the metonymic mapping* (the hand stands for the object resting on it) and the *source of the metaphoric mapping* (a morpheme is a small object). The same holds for the gesture shown in figure 1, in which the speaker seems to be holding a large object between his two hands. Again, the hands (metonymic source) point to the object or the space (metonymic target) extending between them; or, put differently, the action of holding an object (metonymic source) stands for the object (metonymic target) itself. Thereby, the metonymically accessed imaginary object – or, the chunk of space extending between the two hands – is both the metonymic target and the metaphoric source, since it stands for the "sentence" (metaphoric target).

The assumption that some metaphors are grounded in metonymy (Barcelona 2000a: 33; Geeraerts 2002; Goossens 1995: 171; Jakobson 1956, 1960; Lodge 1977: 111; Radden 2000: 93) holds in all the examples in our corpus. Whereas in these cases the speech itself is for the most part non-figurative (i.e., consists of technical grammatical terminology), figurative principles guide the interpretation of these dynamic multimodal representations: first metonymy and then metaphor contribute to the meaning-making processes

linking the manual modality to cognitive processes of association and imagination via contiguity and similarity.

As we hope has become clear in our discussion, in order to interpret these spontaneous expressions conveyed through the manual modality, we rely on our embodied cognitive and sensory-motor abilities and schemata to see and feel the contiguity between the hands and the objects they seem to manipulate (or the hands and different amounts of space extending between them), which stand metaphorically for the ideas concurrently mentioned in the discourse. In other words, in order to arrive at the meaning of these gestures, the viewer can be assumed to perform an act of "pragmatic inferencing" (see work on metonymy in language by Panther and Thornburg 2003, 2004). To conclude this section, what is important to note here is that although, in the examples discussed so far, the concurrent speech is non-metaphorical ("sentence," "teach-," "er"), the gesture depicts the image schema (OBJECT) underlying the metaphorical projection (IDEAS ARE OBJECTS). The bodily modality thus spontaneously and dynamically expresses a metaphorical understanding of abstract entities as imaginary graspable objects. In the next section, we will examine multimodal representations of more elaborate theoretical constructs based on a well-defined set of conventionalized metaphors.

4.2. Metaphorical discourse and theory-based metaphorical visualizations

Having discussed some of the most basic gestural forms that recur in the data, we will now turn to more complex multimodal representations of syntactic structure that are based on a specific model of linguistic structure, namely generative grammar. In these cases, there are ready-made metaphorical visualizations provided by the theory (tree structure diagrams to depict syntactic structure) that can then be referred to by the gestures. For example, when explaining dependent clauses in English, a speaker employing this framework used the right hand to sketch a branch of a tree structure diagram extending toward the lower right of her body. Figure 3 shows such a diagrammatically descending movement that is meant to represent an embedded clause. The speaker illustrates the idea of subordination (G1) by repeatedly moving her right hand first up to eye-level and then downward to her right side, thereby making a wave-like movement by tilting the hand from side to side. This can be assumed to roughly sketch out, through synecdoche, an elaborated tree structure, which is a diagrammatic metaphor used in generative grammar for the structure of complex sentences with subordinate clauses. More importantly, such tree structures are used in linguistic textbooks for

learners and in research articles by scholars – and in the case discussed here, there is a tree diagram behind the speaker on the white board. The fact that the speaker (who is left-handed) is talking about English, a right-branching language, may motivate the use of her right hand for the gesture even further.

(3) (wavy embedded clauses)

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

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

(G1 repeated)

G2

rh extended arm and index finger
point toward ground
coming in verb phrases] [all the way down].



Figure 3. An embedded clause as a wavy diagonal line

The gesture is synecdochic (i.e., an instance of internal metonymy), but its proper interpretation entails a metaphorical interpretation of the metonymically given object, which is then inferred to be the same as the metaphors in the textbook or on the board. In the next gesture in the same utterance (G2) the speaker uses in her speech the metaphor (also tied to the tree diagram) "all the way down" to indicate the fact that in certain cases embedded sentences may continue almost without stopping. At this point the speaker extends her right arm towards the floor and points with her index finger straight to the ground in a deictic gesture (for a Peircean approach to deictic gestures see Fricke 2007). Without the background knowledge of the theory

and its canonical metaphors and diagrams, the gestures could not be interpreted correctly. This is different from the more intuitive examples in section 4.1, in which the speech was non-metaphorical (sentence, morphemes) and the gesture rendered a metaphorical understanding of abstract entities as objects or chunks of space without any ready-made visualization to fall back on.

Since linguistic theories are often built on many specific metaphors, interactions of more than one metaphorical understanding can also be observed in the data. The subordination gesture (G1) in example (3) represents, as we just saw, the notion of "embedded sentence" (mentioned in the concurrent speech) as a wavy line descending in a diagonal toward the floor. Subordinated (embedded) entities are thought of in generative grammar as below the ones that dominate them. This indicates that the theory the speaker has in mind when talking about sentence structure motivates the form the gestures take. Moreover, the theory of syntactic structure proposed within generative grammar rests on a combination of spatial metaphors (i.e., the tree diagram) and power relations (i.e., dominance, control, etc.). The question that arises is whether, and if so, how, these two different source domains are made manifest in the verbal and/or manual modalities.

In the example above, relations of dominance are not alluded to linguistically, but let us look at another sequence where the same speaker makes reference to the idea of dominance in the speech modality. Just as in figure 3, the gesture derives its meaning from the movement and the virtual traces left in the air. As shown in figure 4, the speaker draws a tree chunk in the form of a triangle in the air, with both hands starting out at the center top (the node) and then tracing diagonals outward and downward to either side of the body. The gesture is a synecdochic depiction that is metaphorically interpreted as meaning several technical terms (nodes alpha and delta, domination, and branching). Outside of this theoretical model, these terms do not necessarily entail spatial relationships, or if they do, then they might not be represented in exactly the same way (e.g., "branching" does not necessarily have a downward orientation). An interesting moment occurs when the speaker realizes that she was talking about a node dominating elements without actually having introduced the idea of "dominance." In the speech modality, she quickly changes from the hierarchical understanding of dominance back to the spatial tree metaphor involving a node being "on top of two things." Thus, the speech here is metaphorical in two compatible ways; compatible because spatial and social hierarchies both draw on spatial relations such as UP and DOWN, with certain values attached to each location in the corresponding system (e.g., POWER IS UP, see Lakoff and Johnson

1980). Although in the speech modality there is, for a moment, a slight hesitation about which metaphor to use, the gesture modality consistently and repeatedly represents the spatial features of the tree model and thus is motivated by the corresponding spatial metaphor, which is a conventional part of the theory.

(4) (branching, domination)

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

G1 bh, branch triangle, branching movement x2

[branch, \ (...7)]

okay? /

so that's a technical term, _

G2 bh, branch triangle, branching movement x2

(..) [when the nodes]-, /

G3 rh branch G4 bh triangle, branching movement x2

[a node] [dominates-], /

(..) woops I said a technical term too soon,

G5 rh draws triangle G6 bh triangle branching

(..) when [the node is on top] [of two things] or more, /

(..) it branches. \

Figure 4 represents (1) the very beginning of the branching gesture (hands are joined at the top, the node, of the triangle) and (2) the repeated downward movement that reinforces the idea of an active branching process.

As for the underlying conceptual metaphors, these gestural diagrams all reflect the metaphor SYNTACTIC STRUCTURES ARE GEOMETRIC PHYSICAL STRUCTURES, based on CONCEPTUAL STRUCTURE IS GEOMETRIC PHYSICAL STRUCTURE (Sweetser 1998) discussed above. Given its specific semiotic affordances, gesture, a semiotic system exploiting space, provides a spatial projection of compatible metaphors stemming from the domains of physical structures and social hierarchies with a built in up-down orientation (POWER/HIGH STATUS IS UP; HAVING CONTROL IS UP; BEING SUBJECT TO CONTROL IS DOWN; LOW STATUS IS DOWN; Lakoff and Johnson 1980; Sweetser 1998). Following canonical tree diagrams, these gestures depict

logical relations between entities (which is one of the central functions of diagrams; see Peirce 1960; Mittelberg 2008; Waugh et al. 2004). While within the domain of meta-grammatical discourse "dominance" is indeed used metaphorically, in the manual modality the theory-driven spatial conceptualization of linguistic structure seems to be the predominant, overriding metaphorical understanding that motivates the representation of the behavior and relationship of elements in a sentence. As in the examples discussed in section 4.1, we can also discern a double mapping here: (1) there is external metonymy between the hand (metonymical source) and the trace left in the air (metonymical target), whereby the hand and the line drawn are part of the same experiential domain of drawing a tree structure (whether it is on paper, on a blackboard, or in the air); and (2) through metaphorical projection these spatial tree structures depicted by the gesture (metaphorical source) simultaneously represent the abstract conceptual structure (metaphorical target). The difference between the examples discussed in this section and section 4.1 is that whereas in 4.1 the speech is non-metaphorical, here it is metaphorical and the metaphors referred to are associated with theory-based noniconic visualizations of abstract structure that can be easily mimicked by gesture. Also, the speaker had probably drawn many such tree diagrams on blackboards or paper before depicting them gesturally.

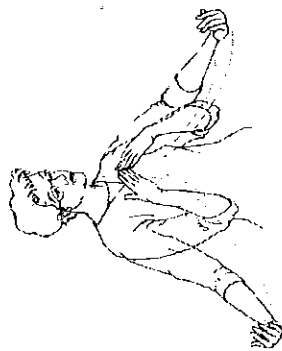


Figure 4. Sentence structure as a laterally branching tree chunk

5. Concluding remarks: Cross-modally achieved, intertwined figures of thought

What all the examples in this paper show is that whether the metaphorical interpretation of the metonymic gesture is simple and easily accessible (e.g., a sentence, morphemes) or complex and only understandable in the context

of a given linguistic theory (e.g., a tree structure, branching, dominance), they still adhere to the general principle of metonymy first, metaphor second, or to say it in another way, metonymy, whether external (adjacency/contact) or internal (synecdoche), leads the way into metaphor. Due to the abstract nature of the subject matter in linguistics courses, the objects in question are conceptualized via metaphor. But metonymy is needed to access the metaphor: e.g., external metonymy (contiguity through adjacency/contact) between, for example, the fist and the small object it seems to enclose, or between the hand drawing a line in the air and the imaginary trace that this movement leaves behind. In the latter case, there is also synecdoche between the diagram on the blackboard, for instance, and the sketchy hand movement representing it. Using the terms of contemporary metonymy theory, we have also claimed that the hands and the actions they perform constitute a common experiential domain and that the imaginary objects or traces are pragmatically inferred from the performed actions.

Taking the material side of gestures as a point of departure, we thus identified associative processes involving two intertwined mappings leading from the form of the gesture to the metaphorically construed entity it stands for. The metonymic mapping functions as follows: in the case of the closed fist that co-occurs with the mention of the morpheme "teach," the perceivable fist serves as a metonymic source triggering cognitive access to the imaginary object inside of it, that is, the metonymic target. In the ensuing metaphorical process, the metonymic target, i.e., the object, becomes the metaphorical source that is mapped onto the metaphorical target, that is, the linguistic unit "teach." Both of these figurative, multimodally achieved efforts are needed to make abstract entities and conceptual structures visible (e.g., when the teacher is unable to point to words or diagrams written on the board), thus grounding them in the immediate teaching context and making them graspable for the student audience. In order to arrive at what is referred to, the addressee of these dynamic multimodal representations needs to interpret a combination of not only speech and gesture, but also metonymy and metaphor, in that order.

We also saw that metaphorically motivated gestural forms do not always coincide with metaphorical speech. Whereas in the examples of the "sentence" or the morpheme "teach," discussed in section 4.1, the speech is technical rather than metaphorical, the gestural illustrations are metaphorically motivated, featuring imaginary physical objects or assigning meaning to chunks of space extending between the manual articulators. These *ad-hoc* gestural metaphors stand in contrast to the sequences discussed in section 4.2, in which the speech is metaphorical; however, the metaphors used in the

speech are given by the theory of generative grammar, which also provides conventional ways of diagramming syntactic structure in the form of inverse tree diagrams. Accordingly, the gestures that depict aspects of "embedded sentences" or "dominance" are more or less sketchy (i.e., synecdochic) renditions of those ready-made visualizations.

In the light of the importance that those who work on multimodal manifestations of figurative thought place on the specific materiality and logic of each modality (e.g., Cienki and Müller 2008; Müller and Cienki, this volume; Forceville 2006; Kress and van Leeuwen 2006; Kress et al. 2001; Mittelberg 2002, 2006), it is interesting to realize that making sense out of what a speaker-gesturer is trying to convey involves our imaginative abilities as much as our visual and auditory senses. Interpreting gestures entails combining perceivable visual and verbal materialized information; but the manual configurations and movements also appeal to our capacity during the process of interpretation to assign meaning to empty space and to fill in missing information, for example, when inferring objects and actions from gestures involving closed fists, open hands, or lines drawn in the air.

In the multimodal manifestations of metaphor and metonymy examined above, source and target meanings are not always neatly distributed across the two modalities (see Forceville 2006), and gesture may be the only modality in which the metaphor is expressed (especially when it is spatial metaphor). Of course, there are also instances in the data in which the speech is metaphorical but there is no gesture. As we saw, source and target domains of a mapping are not necessarily co-present in a given instance of multimodal representation: they may need to be inferred by interpretative hypotheses (Peirce 1991, 1992, 1998) from the discourse and/or physical context (neighborhood/contexture; Jakobson 1956), or the knowledge of the linguistic theory talked about.

Since gesture is a largely unconscious, spontaneous means of expression, the multimodal metaphors discussed here can hardly be compared with elaborated and consciously chosen metaphorical messages in cartoons or advertisements (see Forceville 1996, 2002, 2005; El Refaie 2003, this volume; Yus, this volume; Schilperoord and Maes, this volume). And the question of whether the linguistic explanations and the linguistically expressed metaphors could be recognized and understood by the audience without the gestural support is not answerable on the basis of our data. However, the interplay between metaphor and metonymy deserves, as has been shown already (e.g., Bouvet 2001; Forceville 2005; Gibbs 1994; Whittock 1990), a more detailed scrutiny in other forms of multimodal communication. The Jakobsonian (and Peircean) notions, combined with contemporary cognitivist

approaches, are a way to account for not only the materialized dimensions of figures of thought motivating multimodal discourse, but also for their cognitive and imaginative dimensions.

Acknowledgements

We wish to thank the editors of this volume, Charles Forceville and Eduardo Urios-Aparisi, as well as Alan Cienki and Cornelia Müller for insightful comments on an earlier version of this chapter. We are also grateful to Allegra Giovine, Joel Ossher, and Daniel Steinberg for their help with data coding and to Yoriko Dixon for providing the artwork.

Notes

1. This is very similar to Barthes' concept of "anchoring" (see for discussion Forceville 1996: 71).
2. For reasons of space, the functions fulfilled by the additional modalities and artifacts in the class environment and by the teachers' facial expressions or gaze cannot be included in the analysis here (see Kress et al. [2001] and Ochs et al. [1996] for work on multimodality in the science classroom).
3. See Furuyama (2001) regarding Jakobson's concept of the poetic function in gesture.
4. The abbreviations used in the transcript are to be read as follows: "puoh" stands for "palm-up open hand," "pvoh" stands for "palms vertical open hand," "bh" stands for "both hands." 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 (the peak of a gestural expression), and underlined speech segments indicate a post-stroke gesture hold. G1 in example 1 stands for "Gesture 1." For more details see Mittelberg (2006, 2007).
5. According to Johnson (1987: xiv), an image schema is defined as "a recurring, dynamic, pattern of our perceptual interactions and motor programs that gives coherence and structure to our experience." See Mittelberg (2006, forthcoming) for a complete list of the image-schematic and geometric schemata that emerged from the data.
6. Barcelona (2000a: 4) gives the following definition: "Metonymy is a conceptual projection whereby one experiential domain (the target) is partially understood in terms of another experiential domain (the source) included in the same common experiential domain" (italics in original).

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