



# LUND UNIVERSITY

## Embodiment, language and mimesis

Zlatev, Jordan

*Published in:*  
Body, Language, Mind. Vol 1: Embodiment

2007

[Link to publication](#)

*Citation for published version (APA):*  
Zlatev, J. (2007). Embodiment, language and mimesis. In T. Ziemke, J. Zlatev, & R. Franck (Eds.), *Body, Language, Mind. Vol 1: Embodiment* (pp. 297-337). Mouton de Gruyter.

*Total number of authors:*  
1

### General rights

Unless other specific re-use rights are stated the following general rights apply:  
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

### Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117  
221 00 Lund  
+46 46-222 00 00



# Embodiment, Language, and Mimesis

*Jordan Zlatev*

For years now, leading representatives of theoretical linguistics have been arguing that humans, being governed by a blind ‘language instinct’, can be exhaustively described in physico-biological terms. ... [T]his conception has been shown to be fundamentally false. Humans are also, and crucially, social, normative, and conscious beings, occasionally capable of acts of free will. Esa Itkonen, *What is Language?*

## Abstract

The present focus on embodiment in cognitive science undervalues concepts such as *convention/norm*, *representation* and *consciousness*. I argue that these concepts constitute essential properties of language, and this makes it problematic for “embodiment theories” to account for human language and cognition. These difficulties are illustrated by examining a particular, highly influential approach to embodied cognition, that of Lakoff and Johnson (1999), and exposing the problematic character of the notion of the “cognitive unconscious”. To attempt a reconciliation between embodiment and language, I turn to the concept of (bodily) *mimesis*, and propose the notion of *mimetic schema* as a mediator between the individual human body and collective language.

## 1. Introduction

The main goal of this chapter is to investigate the relationship between language and the concept of *embodiment* which has become a central, if ambiguous, notion within cognitive science (e.g. Varela, Thompson & Rosch 1991; Clark 1997; Ziemke 2003), the neuroscience of consciousness (e.g. Edelman 1992; Damasio 1994, 2000), (neuro)phenomenology (e.g. Varela 1996; Thompson 2001; Thompson & Varela 2001; Gallagher 1995,

2005, *this volume*), cognitive linguistics<sup>1</sup> (e.g. Lakoff 1987; Johnson 1987; Zlatev 1997; Svensson 1999; Evans 2003) and to some extent developmental psychology (e.g. MacWhinney 1999; Mandler 2004). The notion of embodiment is, indeed, even intended to unite efforts in these different fields into what is often called “second generation cognitive science” (Lindblom & Ziemke *this volume*) or “embodied cognition” (Johnson & Rohrer *this volume*). There is much to recommend in this (re)turn to the body in the study of the mind, especially since in many ways it can be seen as a justified reaction to the many shortcomings of “classical” information-processing cognitive science according to which the “mind/brain” works essentially as a computer (e.g. Fodor 1981; Jackendoff 1987; Pinker 1994).

There are, however, three major unresolved issues within the current “embodiment turn” in the sciences of the mind. The first was mentioned in passing already: there is not one but *many* different meanings behind the term “embodiment”, both between and within fields, and the corresponding theories are in general *not* compatible (Ziemke 2003). In particular, I would claim, there is no uniform concept of *representation* within “embodied cognition”, and this is a constant source of (misguided) debate, both between proponents of embodiment and between them and representatives of the “algebraic mind” (Marcus 2001). Second, by their nature, embodiment theories have a strong individualist orientation, and despite recurrent attempts to connect embodiment to social reality and culture (e.g. Palmer 1996; Zlatev 1997; Sinha 1999), there is still no coherent synthesis. In particular, within the work of those emphasizing the role of the “body in the mind” there is no adequate notion of *convention* or *norm*, which is essential for characterizing both human culture and the human mind. Third, there is a dangerous tendency to underestimate the role of *consciousness* in many – though not all – embodiment theories. There seems to be some sort of fear that in appealing to anything that is irreducible to either biology or behavior, one is bound to fall into the clutches of “Cartesian dualism”. The consequence is, however, that such “non-dualistic” approaches run the risk of

---

1. When using small letters, i.e. *cognitive linguistics*, I will refer to the work of linguists who regard language and cognition as intimately connected (e.g. Itkonen, Levinson and Jackendoff). When used with capital letters, *Cognitive Linguistics* refers to the school of linguistics departing from the work of Lakoff, Langacker and Talmy. The borders are admittedly fuzzy, but in general, *Cognitive Linguistics* is a hyponym (extensionally speaking a subset) of *cognitive linguistics*.

one form or another of *physico-biological reductionism*, which as pointed out by Itkonen in the motto to this chapter is deeply misguided.

To substantiate these claims in detail would require an extensive review of the literature, which the allotted space of a book chapter does not permit me. My strategy will therefore be to single out one of the above mentioned fields, cognitive linguistics, and even more narrowly, focus on a single exposition of “embodiment theory”: *Philosophy in the Flesh (PitF)* by George Lakoff and Mark Johnson (1999). This choice is motivated by the following reasons: (a) Lakoff and Johnson are two of the foremost proponents of “embodied cognition” not only in (cognitive) linguistics, but in general, (b) *PitF* is their most recent extensive joint publication, and it is often mentioned as one of the three major reference works on embodiment up to date, along with Varela et al. (1991) and Damasio (1994), and (c) while philosophically oriented, the work deals with implications from linguistic research, and it is precisely in relation to language that the difficulties of “embodiment theory” are most clearly accentuated.<sup>2</sup>

The problem reveals itself when we ask the seemingly simple question: *In what sense can (knowledge of) language be said to be “embodied”?* Prior to answering this question, however, we need to step back and address, if briefly, the fundamental question: *What is language?* In the monograph with this title, from which the opening quotation was taken, Esa Itkonen persuasively argues that the nature of language has been commonly misunderstood in modern “theoretical linguistics” (including both the generative and the cognitive/functional paradigms). Instead of “instincts”, “cognitive modules”, “neural mechanisms” or “usage”, Itkonen (1978, 1983, 1991, 2003) offers a very clear and intuitive answer: *Language is a social institution for communicating meanings*, a conception with sound roots in the tradition, e.g. Saussure (1916), Trubetzkoy (1939) and Wittgenstein (1953). As such, language exists primarily *between* people rather than (only) *within* people. It is “shared” by the members of the community who speak it – in the strong sense in which people can “share a secret”: they all know it, and they know that they know it, rather than in the weak sense of “sharing a bottle of wine”. But what is it that people share when they know

---

2. I should point out that my own previous work on language and embodiment (Zlatev 1997) suffers from the same three drawbacks listed above, i.e. it lacks coherent concepts of representation and convention and, in addition, disregards their dependence on consciousness. My criticism of “embodiment theory” in the first part of this chapter is therefore also a form of (former-)self-criticism.

a language? Above all: linguistically encoded concepts, i.e. lexical meanings, and rules for their combination. In Section 2 of this chapter I will elaborate on this, and argue that it is impossible to account for linguistic meaning without the concept of *representation*. Nearly as obviously, the conventionality of language, as well as the fact that we *follow rules* (which we are free to break) rather than mechanical deterministic procedures shows that our knowledge of language is (in principle) *accessible to consciousness*. This also implies that linguistic knowledge involves declarative, and not only procedural knowledge.<sup>3</sup>

This characterization of language in terms of conventionality, representation and accessibility to consciousness appears to be on a collision course with attempts to explain language in terms of “embodiment”, since as pointed out above, it is precisely these three concepts that are at best underdeveloped, and at worse rejected by proponents of embodied cognition. In the recent work of cognitive linguists such as Johnson and Lakoff,<sup>4</sup> and especially in *PitF*, this dissonance turns into an outright contradiction. In Section 3 I analyse the concept of embodiment as explicated within *PitF* (with some references to other Cognitive Linguistic work to show that *PitF* is by no means an exception), in order to make this contradiction as clear as possible. In brief: if language has the properties that I claim, and if embodiment has the properties that Lakoff and Johnson claim, then *language can not be embodied*. And since language is not just a “module” of the human mind – something that Cognitive Linguistics emphasizes – but

- 
3. Mandler (2004) eloquently argues for the need to distinguish between declarative, conceptual knowledge, which is accessible to consciousness, and procedural, sensorimotor skills, which are not. While language learning and use undoubtedly involve both types, it is a mistake to attempt to reduce all linguistic knowledge to procedural “know-how” as e.g. done by Zlatev (1997). *Consciousness* is a multifaceted phenomenon (and concept) but similarly to Mandler, in this chapter I focus on the *deliberative* aspect of consciousness, rather than on its *qualitative*, experiential aspect. Also it should be noted that in stating that something is *accessible* to consciousness, this does not imply that it is, of course, accessed in any particular moment. Consciousness has a center-periphery structure, so of necessity some of the objects of consciousness will be in the “margins” (Gurwitsch 1964).
  4. Though admittedly, this was less obvious in their earlier formulations, such as their rather inspiring *Metaphors We Live By* (Lakoff & Johnson 1980), as well as Johnson (1987).

largely *constitutive* of it (e.g. Vygotsky 1934; Nelson 1996; Tomasello 1999), then the human mind cannot be embodied either.

However, the overall goal of this chapter is not to criticize the shortcomings of “embodiment theory”, but to attempt to show how the concept can be developed in order to *resolve* the contradiction laid out in the previous paragraph. The first step is to argue in Section 4 that the *PitF* notion of “embodiment” is indeed not viable, and therefore a replacement is required. Then I proceed in Section 5 with an attempt if not to fill, at least to minimize the gap between language and embodiment through the concept of *bodily mimesis*, understood along the lines of Donald (1991, 2001) as the volitional use of the body for constructing and communicating representations. On this basis, I offer conceptual and empirical support for a novel theoretical concept, *mimetic schemas*, which constitute body-based, pre-linguistic, consciously accessible representations that serve as the child’s first concepts (Zlatev 2005). Furthermore, mimetic schemas possess a basic intersubjectivity which can serve as the foundation for developing a conventional symbolic system, i.e. language. In Section 6, I briefly outline how the concept of mimetic schemas can contribute to the (hopeful) resolution of a number of puzzles in explaining language evolution, acquisition and spontaneous gesture. Finally, I summarize the argument.

## 2. Language

The claim that language is primarily a social institution for communicating meanings, stated in the introduction, is customarily met with incomprehension by linguists and psychologists.<sup>5</sup> To put the objection into the terminology of this volume: what is the “embodiment” of this institution? Part of it may be in writing systems and other artifacts (Donald 1991; Clark 1997; Sonesson *this volume*), but would not language cease to exist if it were not instantiated within the minds of its users, the individual speakers? Well, this can be debated since one can argue that “dead languages” are not really

---

5. This statement may seem to contradict occasional remarks in the cognitive linguistic literature concerning the “social dimension” of language, and the frequent use of phrases such as “conventional imagery” (Langacker 1987) and “conventional metaphor” (*PitF*). The implications of these remarks are, however, never explored. In particular, it is never explained how is it possible that *individual* mental phenomena such as imagery and metaphorical “mappings” can at the same time be conventional, i.e. *social*.

dead if they have been preserved in written texts and especially in a grammatical description, because that would allow them to be “recreated” by studying the texts and grammar, which is more like (collective) remembering than rediscovery. But, of course, it must be granted that language is an individual as well as a social phenomenon and none (or very few) of the social accounts of language has ever denied this. However, even as an individual psychological phenomenon, as say, *knowledge of English* rather than the social institution *English*, language can be shown to consist of conventional representations accessible to consciousness. Let me try to explicate. What do I need to know in order to understand (1), which has been uttered by, say, Peter? Minimally, I would need to know the (social) facts (2) – (7).

- (1) *John kissed Mary.*
- (2) The word *kiss* means KISS.
- (3) The words *John* and *Mary* are names of a male and a female human being, respectively.
- (4) The word order shows that John kissed Mary, rather than vice versa.
- (5) The past tense signifies that event described occurred sometimes in the past relative to the time of utterance.
- (6) The sentence (normally) expresses an assertion.
- (7) The names *John* and *Mary* actually refer to individual X and Y.

But this is not enough to guarantee that I understand Peter. Imagine that I know (2–7), but Peter, who has had a rather idiosyncratic upbringing, thinks that *kiss* means HIT-ON-THE-HEAD. I will then fail to understand the meaning of (1) as meant by Peter. So I must also know that Peter knows (2–7). Furthermore, I must know, or at least assume, that Peter knows that I know (2–7). For if Peter thinks that I’ve had a strange upbringing, or maybe as a foreigner I do not have a proper command of English, then he may not be using (1) in its conventional way, even though he knows (2–7). If this seems far-fetched, consider only (7), which involves not the meaning (*Sinn*) of the names *John* and *Mary* but their reference – or *Bedeutung* according to the classical distinction of Frege (1882 [1997]). Here it is easier to see that unless Peter and I can be quite sure not only that both of us know who the names refer to in this context, but that Peter knows that I know, and I know that Peter knows, there might be a misunderstanding. For instance, I am thinking of Mary Smith, and Peter is thinking of Mary Smith. But if I don’t know that Peter knows that I am thinking of Mary



Smith rather than Mary Williams, then I couldn't be sure who he is really referring to by Mary in uttering (1).

This type of reflexively shared knowledge is known as *common knowledge* (Itkonen 1978), *mutual knowledge* (Clark & Marshal 1981) or *common ground* (Clark 1996). A convenient way to say that (2–7) are part of common knowledge is to say that they are *conventions* (Lewis 1969; Clark 1996), *norms* (Itkonen 1978) or even *rules* (Wittgenstein 1953; Searle 1969).<sup>6</sup> These closely related terms have rather complementary implications, so while I will predominantly use the term *conventions* to refer to our knowledge of facts such as (2–7), it is crucial to remember that this knowledge is *normative*, in the sense that one can be right or wrong according to public criteria of correctness (Wittgenstein 1953; Baker & Hacker 1984), in one's use of these conventions. This normativity can be on various levels of explicitness and scope ranging from prescriptive grammars for the "national language" to intuitions about "the way we talk in our family". However, it is always social and always involves a *degree of conscious awareness*, since to be following a convention/norm/rule – as opposed to the movement governed by a reflex or a blind habit – one must be able to compare it to actual usage and notice any potential mismatch. It is senseless to talk about this *noticing* of a difference between "should" and "is" without being *aware* of the difference and this implies at least a degree of consciousness. Such conscious processes of noticing and judgment are also essential for the acquisition of language by pre-verbal children (e.g. Bloom 2000) and by second-language learners (Schmidt 1990). As argued at length by Mandler (2004: 228), without consciousness, language acquisition could not come off the ground:

The ability to make an old-new distinction requires awareness of prior occurrence or pastness; its loss is one of the hallmarks of amnesia. Amnesiacs retain the ability to be influenced by past experience and to learn at least certain new skills, but they have lost the awareness that these experiences are familiar to them.

---

6. Unfortunately, all these terms have other (negatively charged) meanings when applied to language, thus *conventional* is often identified with "arbitrary". *Norm* has bad connotations for linguists since it is associated with "normative grammar", which prescribes rather than describes. Finally, *rule* is often interpreted as an explicit, algorithmic, non-creative procedure, which is just about the opposite of what e.g. Wittgenstein (1953) meant by "rule-following".

One of the things that amnesiacs can not learn is a new language, implying that language can not be acquired by processes of implicit learning of the type that are modeled by most connectionist models (e.g. Elman 1990), which do not require conscious awareness.

Thus we can conclude that knowing and learning conventions such as (2–7) involves making them *accessible to consciousness*. Notice that I am not claiming that consciousness is involved in every aspect of language learning and use: it is beyond doubt that implicit learning and procedural knowledge are important as well. My claim is that consciousness is at least essential for (a) the acquisition of concepts and rules, (b) the ability to notice any “breaking” of the rules and (c) all forms of meta-linguistic knowledge. It is (b) and (c) that are the basis for all grammaticality judgments and linguistic analysis and thus for traditional or “autonomous” linguistics (Itkonen 1978, 1991). On the other hand, attempts to make linguistic theories “psychologically real” have always attempted to reconcile the analysis obtained from (b–c) with the learner’s perspective in (a). While there are obvious differences in the three processes (a), (b) and (c), conscious awareness unites them, and sets them apart from the “automated” procedures that underlie reflexes and habits of the kind that govern the behavior of most animals, and which are *also* important for human beings.

Language conventions can concern pronunciation (phonology) or the combinations of words and phrases (morphology and syntax), but the most important conventions and those that distinguish language from other convention/norm/rule systems such as those in dancing tango, boxing or eating at a restaurant concern semantics and pragmatics. In all the aforementioned activities there is a “right” and a “wrong” way of doing things and that is how we know that they are conventional-normative. But in language (and some other semiotic systems) one can be right and wrong *representationally*.

There are two ways in which linguistic utterances like (1) can be properly regarded as representations. Both are conveniently explicated by the classical *semiotic triangle* (Ogden & Richards 1923), displayed using generic terms for its three relata in Figure 1.

First, the relationship between Expression and Meaning, the latter considered as conventional context-general *content*, is that of the classical Saussurian *sign*, the first one corresponding to the “signifier”, the second to the “signified”. What 100 years of theoretical linguistics and especially functional/cognitive linguistics (Givón 2001; Lakoff 1987) have added to this basic insight is that the relationship need not be as “arbitrary” as Saus-

sure assumed, especially considering that grammatical constructions are also a kind of sign, and these are at least to some degree motivated by factors such as iconicity and indexicality (and are thus not classical Peircean “symbols”). This, however, does not mean that the mapping between Expression and Meaning is any less *conventional* (Zlatev 2003). The first five of the conventions involved in understanding (1) as an English *sentence* (2–6) involve linguistic signs in this sense.

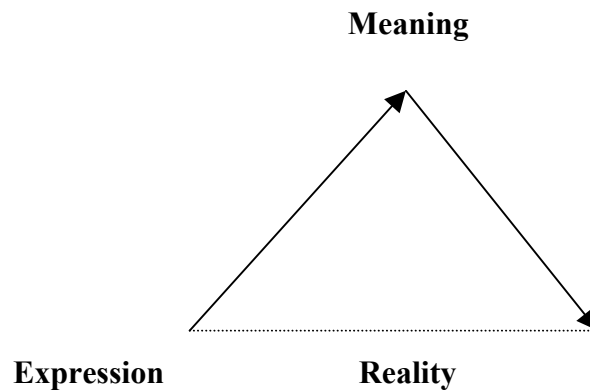


Figure 1. The “semiotic triangle”, after Odgen and Richards (1923).

What about the relationship Meaning-Reality? First of all, age-old philosophical problems concerning the “aboutness” of language can be resolved by noting that it is *not* the expressions of language that relate directly to reality (this is implicit in the notion of the semiotic triangle), and *not* meaning in the sense of conventional content either, but rather meaning as illocutionary (speech) acts, performed by speakers and hearers by intentionally imposing illocutionary force on the propositional content of sentences. Or as expressed succinctly by Searle (1999):

Language relates to reality in virtue of meaning, but meaning is the property that turns mere utterances into illocutionary acts. (*ibid*: 139) [...] The conventional intentionality of the words and the sentences of a language can be used by a speaker to perform a speech act. When a speaker performs a speech act, he imposes his intentionality on those symbols. (*ibid*: 141)

There are three important aspects of this process in relation to our discussion of the nature of language that need to be emphasized. First, the “impo-

sition of intentionality” on the part of the speaker (and its interpretation by the hearer) is clearly dependent on conscious awareness – unless the speaker is talking in his sleep and thus speaking “non-intentionally”, in both the everyday and the philosophical sense of the word. Second, at least in the case of *assertives* including speech acts such as statements, descriptions and classifications which have what Searle calls a “mind-to-world direction of fit” we have a fairly clear representational relation between Meaning and Reality: the speech acts are “pictures of reality” that can be either true or false. This is not representation in the Saussurian sense but rather in the sense of the *Tractatus* (Wittgenstein 1923 [1961]), with the provision that it is *utterances* spoken by speakers that are true or false, not sentences – as famously emphasized by Strawson (1950) in his critique of Russell (1905).

It is this representational relationship that is denied by pragmatism, and by many representatives of cognitive linguistics (Lakoff & Johnson 1999; Johnson & Lakoff 2002; Johnson & Rorher *this volume*). But such objections seem to be beside the point, since they concern the metaphysics of an “objective reality” and the epistemology of “objective truth”, where both sense of “objective” are understood as mind-independent. However, all that is necessary in order to regard the relationship between a statement and a state-of-affairs (SoAs) as a *representation*, is for: (a) the first to be *about* that SoA, rather than just in association with it, (b) the speaker of the statement to be aware of (a), and (c) the possibility of the statement/representation to either match or not the SoA.

Nothing in (a–c) requires either the SoA or the matching with the statement to be “mind-independent”. These conditions are fulfilled in Lakoff and Johnson’s definition of “embodied truth” (1999: 106), so even in their account the meaning of a (true) sentence can be regarded as a (matching) representation of a situation. Even if the representational relation between linguistic meaning and reality-as-conceived is to be rejected, for whatever reasons, then there is still the Saussurian representational or “symbolic” relationship between “the phonological” and “the semantic pole” (Langacker 1987), i.e. expression and content. In short, representation is simply inescapable in accounting for language (Sinha 1988, 2005).

Finally, we should note that the “imposition of intentionality” mentioned by Searle in the previous quote is not a private, speaker-internal matter, but is constrained firstly by the conventional meaning of the expression(s). This is what makes it difficult (though perhaps not impossible) to express your love by saying *I’ll kick you*. The second constraint is a more

situation-specific and dynamic sort of intersubjectivity, exemplified by the need to have a “common ground” for figuring out the referent of the names *John* and *Mary* in (7). In order to successfully refer, you need to formulate your speech act in a way that will make the referent intersubjectively “shared” for you and your hearer, and this requires a fairly keen sensitivity to the norms of the language, to the situation and to your interlocutor’s state of mind. All this is unthinkable without consciousness, as also pointed out by Donald (2001), and takes quite some time and effort to be mastered by children.

To sum up, the discussion in this section has pointed out the following features that can be regarded as definitional of human language: *conventionality*, implying normativity; *representationality*: between expression and content and between an assertive speech act and reality; *accessibility to consciousness*: necessary for the establishment of common knowledge and for the management of successful communicative action.<sup>7</sup>

A characteristic feature of language that has not been discussed is one that is perhaps most often mentioned in discussions of the “uniqueness of language” in respect to other human and animal systems of communication – to the extent of forgetting those listed above – namely, the *systematicity* of language (Saussure 1916; Deacon 1997). It is true that this is an essential feature of language, and something that for example distinguishes language from gesture (McNeil 1992; Senghas, Kita & Özyürek 2004). It should be pointed out, however, that this concerns not the “syntax” of language alone, but its general capacity to express an unlimited number of meanings, both in the sense of content and speech acts. Finally, while the primary function of language is social interaction, once internalized, it becomes a representational vehicle of thought, transforming the cognition of its user (Nelson 1996; Tomasello 1999).

Therefore, a suitable concise definition of language would be: *A consciously supervised, conventional representational system for communicative action and thought*. This is admittedly terse and different from what one usually finds in linguistics textbooks, but it is no more than the compact summary of the explication provided in this section. If this explication has been clear enough, then its relative non-orthodoxy is no reason for it not to be accepted.

---

7. Though, to remind once again, reflective consciousness need not be involved in every aspect of learning, producing and understanding language.

### 3. Embodiment

Let us now turn to see how embodiment is defined within Cognitive Linguistics, focusing on the recent work of Lakoff and Johnson, and above all on *PitF*. Somewhat surprisingly, there is no straightforward definition of “embodiment” to be found in a 624 page book with the subtitle *The Embodied Mind and its Challenge to Western Thought*, the closest approximation being: “...there are at least three levels to what we are calling the embodiment of concepts: the neural level, phenomenological conscious experience and the cognitive unconscious” (*PitF*: 102). What are these (“at least”) three levels?

Starting from the bottom, we are told that “neural embodiment concerns structures that characterize concepts and cognitive operations at the neural level” (*PitF*: 102). It is furthermore claimed that this level “significantly determines [...] what concepts can be and what language can be” (*PitF*: 104). One of the most specific definitions of “an embodied concept” is provided in terms of this level only: “An embodied concept is a neural structure that is part of, or makes use of the sensorimotor system of our brains. Much of conceptual inference is, therefore, sensorimotor inference” (*PitF*: 20, *original emphasis*). However, Lakoff and Johnson make it clear that they will not deal with the nitty-gritty of neurobiology like “ion channels and glial cells” (*PitF*: 103) since the neural level refers to a higher-level generalization that is heavily dependent on “an important metaphor to conceptualize neural structure in electronic terms” (*PitF*: 103). Thus, the connectionist model of Regier (1996) is given as an instance of “neural modeling”, even though it is quite removed from what is known about the brain (and even though Regier does not apply the adjective “neural” to the model himself and repeatedly points out that his model is only inspired by some aspects of neural systems).

The next level, “phenomenological embodiment”, is devoted much less attention. Its first definition is “[...] the way we schematize our own bodies and things we interact with daily” (*PitF*: 36), with reference to the phenomenological tradition and specifically the work on the body schema and the body image of Gallagher (1995). The second definition is considerably broader: “It [i.e. phenomenological embodiment] consists of everything we can be aware of, especially our own mental states, our bodies, our environment and our physical and social interactions. This is the level at which we speak of the “feel” of experience [...]” (*PitF*: 103). What the authors do not make clear is whether all conscious experience should be considered as

“phenomenological embodiment”, and if so, why this is the case. At the same time, they point out that “phenomenology also hypothesizes nonconscious structures that underlie and make possible the structure of our conscious experience” (*PitF*: 103). This heralds the arrival of the main hero of Lakoff and Johnson’s account of embodiment: the “cognitive unconscious.”

The cognitive unconscious is the massive portion of the iceberg that lies below the surface, below the visible tip that is consciousness. It consists of all those mental operations that structure and make possible all conscious experience, including the understanding and use of language. (*PitF*: 103)

This level is said to be “the realm of thought that is completely and irrevocably inaccessible to direct conscious introspection” (*PitF*: 12) and (nearly) all-pervasive: the cognitive unconscious constitutes “the 95 percent below the surface of conscious awareness [that] shapes and structures all conscious thought” (*PitF*: 13). In case the reader should wonder how this all-important level (of embodiment) that is “completely and irrevocably inaccessible” was discovered, Lakoff and Johnson point out that it is “hypothesized on the basis of convergent evidence, [...] required for scientific explanation” (*PitF*: 115) and that “the detailed processes and structures of the cognitive unconscious (e.g., basic-level categories, prototypes, image schemas, nouns, verbs, and vowels) are hypothesized to make sense of conscious behavior” (*PitF*: 104). So it turns out that this all-important level of embodiment is a hypothetical theoretical construct. It is clear that Lakoff and Johnson feel pressed to defend the “reality” of this construct and they attempt to do so repeatedly. Perhaps the most revealing statement is “To say that the cognitive unconscious is real is very much like saying that neural “computation” is real” (*PitF*: 104). But is neural computation “real”? We will return to this in the next section.

What can one say of Lakoff and Johnson’s notion of embodiment? It is obviously in contradiction with the account of language presented in Section 2. Not only does *PitF* imply that “95 percent of all thought” and consequently of language is completely below the level of conscious awareness, Lakoff and Johnson’s definition of “embodiment” has no real place for the two central concepts of conventionality and representation. Regarding the first, there are frequent references to “conventional mental imagery” (*PitF*: 45), but it is not even made clear whether this imagery is conscious or only part of the “cognitive unconscious” – not to mention the question of how this imagery would be shared, and furthermore known to be shared, which is necessary for it to be conventional. One could say the

same for the use of the term “conventional metaphor” in the cognitive linguistic literature – there is nothing “conventional” about neurally realized domain-to-domain mappings, at least in any conventional use of the term convention (e.g. Lewis 1969, see footnote 5).

When Lakoff and Johnson feel pressed to account for shared meanings, they do point out that “commonalities [...] exist in the way our minds are embodied” (*PitF*: 4) and that “we all have pretty much the same embodied basic-level and spatial-relations concepts” (*PitF*: 107). But this is clearly not enough to give you conventions such as those of (2–7) and to account for how a simple English sentence such as (1) is understood.

Concerning the concept of representation, Lakoff and Johnson represent quite clearly the anti-representationalist *Zeitgeist* within “second generation” cognitive science (e.g. Varela et al. 1991), which as pointed out in the introduction eschews the concept of representation in reaction to its overuse in “classical” cognitive science (e.g. Fodor 1981). In a recent (polemical) publication of the two authors this is made explicit:

As we said in *Philosophy in the Flesh*, the only workable theory of representations is one in which a representation is a flexible pattern of organism-environment interactions, and not some inner mental entity that somehow gets hooked up with parts of the external world by a strange relation called ‘reference’. We reject such classical notions of representation, along with the views of meaning and reference that are built on them. Representation is a term that we try carefully to avoid. (Johnson & Lakoff 2002: 249–250)

A similar if not stronger form of anti-representationalism is advanced by Johnson and Rohrer (*this volume*: Section 6):

We have been arguing against disembodied views of mind, concepts, and reasoning, especially as they underlie Representationalist theories of mind and language. Our alternative view – that cognition is embodied – has roots in American Pragmatist philosophy and is being supported and extended by recent work in second-generation cognitive science.

In their urge to dissociate themselves from any “disembodied views of mind”, scholars like Lakoff, Johnson and Rohrer, as well as many other representatives of second-generation cognitive science (e.g. Brooks 1999) can be said to overkill (mental) representations. It is one thing to (justly) argue against “representations” in perception and active involvement, as done by Dreyfus (1972 [1993]) with support from the phenomenological tradition (e.g. Merleau-Ponty 1945 [1962]), and quite another to deny that, say, a picture is a representation of whatever it depicts, irrespective of



whether the latter exists in the “real world” or not (Sonesson 1989, *this volume*). It is in this latter sense that some, though not all, language use is representational. Furthermore, to deny that assertions are a kind of representation is to deny for example that a description of a situation can be either true or false. As pointed out in Section 2, Lakoff and Johnson should not really deny this since in their definition of “embodied truth” a person holding a sentence to be “true” is said to understand the sentence to “accord” with “with what he or she understands the situation to be” (*PitF*: 106). This is clearly a roundabout way of saying that the person understands the sentence to represent the situation correctly. But what is won from such avoidance of the notion? There is nothing “strange” or “metaphysical” in the concepts of representation and reference once it is understood that these are performed by conscious speakers (and signers), not by the expressions in the language themselves. To restrain oneself from using these concepts in accounting for language is to make it impossible to account for the difference between language and perception, or between theatre and love-making. (Though admittedly, the latter may be more fun.)<sup>8</sup>

In this section I have tried to make it as clear as possible that there is a contradiction between the account of language presented in Section 2 and the account of embodiment given by Lakoff and Johnson in *PitF*, which I have suggested is not atypical for much of “embodied cognition” or “second generation cognitive science”. If my account of language and Lakoff and Johnson’s account of embodiment are both accepted, then it follows that “embodiment theory” cannot account for language, and since language is a central part of the human psyche, it cannot account for the latter either.

This negative conclusion can be avoided in one of two ways: Lakoff and Johnson (and their colleagues) would presumably argue that I have misconstrued language. The alternative, which (unsurprisingly) I undertake in the following section, is to argue that the concept of embodiment presented in *PitF* is inadequate, as a preliminary to suggesting how the concept of bod-

---

8. Rather more troublesome is the fact that in a pragmatist evolutionary theory insisting on the “continuity” of all cognition such as that of Johnson and Rohrer (*this volume*) there is no place for a qualitative distinction between the cognition of human beings and ants... Compare: “According to our interactionist view, maps and other structures of organism-environment co-ordination are prime examples of non-representational structures of meaning, understanding, and thought.” (ibid: Section 3.3) with “Ant cognition is thus nonrepresentational in that it is both intrinsically social and situated in organism-environment interactions.” (ibid: Section 5)

ily mimesis can contribute to a more adequate notion of human embodied cognition that naturally combines with the three essential features of language: convention, representation and accessibility to consciousness.

#### 4. Embodiment lost? A critique of Lakoff and Johnson (1999)

Let us begin with Lakoff and Johnson's first level of embodiment: the "neural level". An obvious question to ask is why the exclusive focus on the brain (and the rest of the nervous system) at the expense of the whole living body? One reason seems to be that the activity of the brain could *possibly* be understood "computationally" – using the "neural computation" metaphor – while that of the whole bio-chemistry of the body cannot, in any remotely meaningful way. Another reason seems to be that the "non-neural" parts of the body are not considered relevant for the "shaping" of cognition. It seems to be that for Lakoff and Johnson "brain and body are used as substantially interchangeable" (Violi 2003: 205). Leaving for the time being phenomenological aspects, this is still deeply problematic. Is a brain-in-a-vat just as embodied as a living body? There are at least two good, more or less obvious, reasons to doubt this. First, all sensorimotor interactions with the environment are performed by using our limbs, muscles, eyes, ears, nose, skin, tongue etc. – not with the somatosensory cortex itself. Or is it so that Lakoff and Johnson hold that these periphery systems are merely "transducers" and could equally well be substituted by artificial correlates managing the input-output of electrical signals to the brain? Whatever the tenability of this position, it is clearly a very "non-embodied" way to think of cognition, and, for that part, of the brain itself (see Lindblom & Ziemke *this volume*). The second reason is that the living body participates not only in interaction with the environment, but in *evaluation* of it – at least according to somatic theories of emotion such as that of Damasio (1994, 2000). According to Damasio certain regions of the brain constantly monitor the state of the whole body, and depending on its "well-being" judge external stimuli (though as we all know, people have found many ways to trick these monitoring systems over the ages, allowing them to "feel good" while their body is not thriving). If this is still somewhat speculative, let us simply remind of an aspect of our non-neural bodies that has a strong effect on our emotional life, and thereby on our thinking: the hormonal system. What all this points to is that even when regarding the body from an external, "third-person" perspective, it is a gross simplifica-

tion to consider only the nervous system as relevant for cognition. The living body as a whole is relevant, and the kind of embodiment this involves could be called simply “biological” or perhaps “organismic embodiment” (Ziemke 2003; Zlatev 2003).

Turning now to the “phenomenological level” of Lakoff and Johnson’s three-level notion of embodiment (in *PitF*), we can notice the opposite tendency: if there was an under-extension of the role of the body when regarding embodiment as a biological phenomenon, there appears now to be an over-extension by equating bodily awareness with all conscious experience, i.e. “everything we can be aware of” (*PitF*: 103). While it is clear that phenomenal bodily experience is involved in physical interactions, either with the inanimate environment or in physical social interactions such as chasing, wrestling, love-making... it is far from obvious what role the *body schema*, or even the *body image* (Gallagher 1995, 2005, *this volume*) play in more detached social interactions, such as tax payment – while I am presumably conscious when I fill in my tax-return forms. Lakoff and Johnson never address this problem, which is unsurprising since consciousness is on the whole treated by the authors in a rather step-motherly fashion: tolerated out of necessity but neglected.

It is characteristic that others who have given a more prominent role to consciousness or “subjectivity” in linguistics and cognitive science do *not* view it primarily in terms of embodiment. Thus Talmy (2000) writes “Meaning is located in conscious experience. In the case of subjective data, ‘going’ to their location consists in introspection. [...] Consciousness is thus often a necessary concomitant at the subject end within cognitive science” (ibid: 5–6). It is not obvious that the (phenomenal) body plays any important role in such introspection. Similarly, in discussing the notion of perspectivity in language, treated as a form of embodiment by MacWhinney (1999), Violi (2003: 218) writes that “both the perspective a given grammatical construction imposes on the action, and the perspective connected to interpersonal and social frames, refer to subjectivity more than embodiment”. Notice that I am not saying that this latter claim is necessarily true – it could turn out on closer inspection that the phenomenal body is implicated in all kinds of social interaction and even in linguistic perspective-taking. One of the goals of the analysis presented in the next section is precisely to suggest a greater role for phenomenal embodiment for language and cognition. But the elucidation of the role of embodiment for subjectivity and experience is an enormous task, begun by the classical phenomenologists like Husserl and Merleau-Ponty (cf. Gallagher *this vol-*

ume), and continued more empirically by (neuro)phenomenologists such as Varela (1996), Thompson & Varela (2001) and Gallagher (1995, 2005, *this volume*), semioticians (Violi 2001; Sonesson *this volume*), cognitive scientists (Donald 1991), etc. One cannot simply call consciousness “phenomenological embodiment” and leave it at that.

However, the major problem with the *PitF* approach to embodiment is neither of the above two levels – the “neural” and the “phenomenological” – but the third, and as shown earlier crucial, element in Lakoff and Johnson’s theory: the “cognitive unconscious”. In the remainder of the section I will argue that this notion is conceptually incoherent and rather than being amended should be simply disposed of.

First, the notion conflates two very different kinds of entities. On the one hand are structures such as “domain-to-domain mappings”, “neural computations” and “image schemas” which are hypothesized to operate with an unconscious causality that one can become as aware of as, say, synaptic growth or the operation of the immune system, that is, not at all. On the other hand Lakoff and Johnson mention “nouns, verbs and vowels” (*PitF*: 104), i.e. categories which (nearly) all linguists analyzing all human languages recognize, by applying standard practices of *conscious* linguistic analysis. Since these analyses are not based on generalizations from speakers’ “behavior”, despite occasional claims to the contrary, but on the basis of linguistic intuitions (of correctness), it becomes clear that even “naïve” speakers have consciously accessible knowledge of these categories of their language. Thus the denizens of the Cognitive Unconscious are of two different ontological kinds: the first, to repeat, are hypothetical causal mechanisms, while the second are explications of linguistic knowledge that are consciously accessible. As expressed by Itkonen (1978) in a different, but analogous, context:

[W]e have here a confusion between the following two types of entities: on the one hand, the concept of ‘*correct sentence of a language L*’, which is the object of conscious knowledge; on the other, *utterances of language L*, which are manifestations of unconscious ‘knowledge’. In the former case ‘knowledge’ equals consciousness, while in the latter, ‘knowledge’ is a hypothetical dispositional concept. (Itkonen 1978: 82)

A second objection is methodological: what is the status of the evidence for postulating the various structures of the Cognitive Unconscious? Lakoff and Johnson often refer to “converging evidence”, but does this evidence really converge? On inspection it turns out to be very heterogeneous. On the one hand is *intuition* and *introspection*, resulting in e.g. analyses of

semantic polysemy as “radial categories” (Lakoff 1987) or Talmy’s (2000) grammatical and semantic analyses which are acknowledged to be phenomenological (see above). On the other hand there is psycholinguistic experimentation involving unconscious mechanisms such as “semantic priming” (Cuyckens, Sandra & Rice 1997; Tufvesson, Zlatev & van de Weijer 2004) as well as neurolinguistic studies getting even closer to the actual causality of the brain processes (e.g. Rohrer 2001; de Lafuente & Romo 2004). Methodological pluralism is to be applauded, but the task of combining evidence from disparate sources into a coherent framework is formidable, and is not made easier by postulating levels that are inaccessible to both introspection and empirical observation such as the Cognitive Unconscious. In contrast, the framework of “levels of investigation” proposed by Rohrer (*this volume*) suggests how different kind of evidence can be brought together in a nonreductionist manner, without any “cognitive unconscious”.

The third objection is more general (and philosophical). It involves not just the Cognitive Unconscious postulated by Lakoff and Johnson and the methodological self-understanding of Cognitive Linguistics, but all forms of “information processing” psychology and cognitive science that postulate the existence of *mental* phenomena which are completely divorced from and inaccessible to consciousness. The problem is the following: *without consciousness, there is no basis for distinguishing mental from non-mental states within an organism*. As pointed out by Searle (1992: 154): “not every state of an agent is a mental state, and not even every state of the brain that functions essentially in the productions of mental phenomena is itself a mental phenomenon”. Searle’s favorite examples are myelination and the OVR reflex: both are important for cognition, but in what sense can they be said to be mental? And if they are, then anything neural is mental. But in this case we have abolished the distinction mental vs. neural. Now that maybe something that “identity theorists” (e.g. Armstrong 1968) and “eliminativists” (e.g. Churchland 1992) in the philosophy of mind would applaud. However all such proposals have so far run aground, and the “mind-body problem” remains unsolved (Maslin 2001).<sup>9</sup>

---

9. Furthermore, Lakoff and Johnson (1999, Chapter 7) claim to be neither identity theorists (reductionists) nor eliminativists with respect to consciousness, so they would need a principled means to distinguish conscious experience from its neural/biological underpinnings.

Within information-processing, “classical” cognitive science a common way to make the distinction between mental and non-mental without recourse to consciousness is through the notion of *computation*: mental processes are involved in (symbolic) computation, non-mental ones are not (e.g. Jackendoff 1987; Pinker 1994; Marcus 2001). Despite their overall rhetorical debate with and opposition to information processing theorists, through their endorsement of “neural computation” Lakoff and Johnson come surprisingly close to the position of their opponents. Unfortunately the “computational” solution to the mental/non-mental distinction does not work for a very simple reason: there is no *intrinsic* computation going on in the brain, as argued at length by e.g. Searle (2002). All talk of neural computation is metaphorical, in the sense that it is a matter of attribution from the outside, just as in, say, computational interpretations of the weather processes or of water flow. And because of that, the “computational level” is not ontologically or causally distinct from the neural level: “Except in cases where an agent is actually intentionally carrying out a computation, the computational description does not identify a separate causal level distinct from the physical structure of the organism” (Searle 2002: 126). It is only a matter of “level of description”, which is something completely different: a matter of epistemology rather than ontology.

A possible objection to defining the mental (or the “cognitive”) through consciousness and thereby denying the coherence of the notion of the Cognitive Unconscious is the existence of *unconscious* mental states, either of the obvious kinds including our beliefs when we sleep or otherwise not think about them, and the less obvious kind due to “repression” according to Freud (1949). The claim would be that when not conscious, unconscious mental states have some intermediate state of existence – not neural, not conscious – and when this intermediary realm is granted, then why can’t it be populated by all sorts of mental phenomena, some of which could never be accessible to consciousness? However, this possibility is rejected by what Searle calls *the connection principle*: “all unconscious intentional states are in principle accessible to consciousness” (Searle 1992: 156). In a nutshell, the argument is the following:

All intentional states have *aspectual shape*: whatever they are about is seen from a certain perspective rather than other, so that extensionally identical entities such as “the Evening Star” and “the Morning Star” (cf. Frege 1882) have different aspectual shapes.

Aspectual shape cannot be exhaustively characterized in third-person predicates, either as brain states or as behaviors. This finds support in Quine's (1960) thesis of the indeterminacy of translation.

When unconscious, mental states exist as neurophysiological phenomena, rather than in a mental space that is kept outside the purview of consciousness.

On this basis one can draw the conclusion: "The notion of an unconscious intentional state is the notion of a state that is a possible conscious thought or experience" (Searle 1992: 159). There has been extensive discussion of this argument in the recent philosophical literature into which I will not go (cf. Garrett 1995). But suffice it to say that while one can discuss any of the three premises above in some detail, Searle offers a coherent way to think about unconscious mental states *without* postulating a "cognitive unconscious". Since the concept is problematic both ontologically and methodologically, as suggested earlier, this places a heavy burden on those who appeal to "unconscious mental processing" that is different from both neuro-physiological processes and conscious thought to convince us of the reality of their claims.

Lakoff and Johnson are aware of the difficulty, and spend some three pages arguing for the "causal efficacy" of their construct. However this defense is far from convincing. Rather it displays the unconventional ways in which crucial theoretical concepts are used in their work. First, it is claimed that an unconscious "basic-level concept like *chair* is both intentional and representational" (*PitF*: 116). Undoubtedly, but in what way is it unconscious? If *chair* is not the concept of a conscious subject, then who is it that *applies* the concept to whatever it is about? Intentional states are not self-interpreting so there must be an unconscious "homunculus" doing the job, in whose mind there must be yet another etc. Similarly for the claim that there are unconscious representations – if there is no ability for *mis*-representation, error, we cannot speak of representation in any non-vacuous way. But when there is error, if not earlier, the discrepancy will be noticed, i.e. brought into consciousness. Notice that I am not stating that representations need to represent "objective reality" and thus I am not committing the sin of "objectivism" that is so much abhorred within Cognitive Linguistics (Lakoff 1987) – what is essential however is that there are *criteria* for judging the adequacy of the representation, and at least in the case of language, these need to be public, as shown by Wittgenstein and pointed out earlier.

So to summarize, Lakoff and Johnson's crucial notion of "the cognitive unconscious" faces a dilemma: If it is a generalization of neuronal activity, it is clearly causally efficacious, but then it is not separate from "neural" or rather "biological" embodiment. On other hand, if it consists of intentional, representational phenomena such as concepts, nouns and vowels, then each one of these is (potentially) conscious, and therefore "phenomenological." In both cases the Cognitive Unconscious is redundant. Furthermore, since the role of the phenomenal body for cognition and especially for language is still unclear, we are left with the provisional conclusion that language/mind may not be embodied in any interesting, non-trivial way, i.e. apart from saying that there are "realized in" or "supported by" living matter.

## 5. Bodily mimesis

There is, I would argue, another and more productive way of linking the concept of embodiment to language: one that is based on the concept of *bodily mimesis*, understood as the use of the body for representational means (Donald 1991, 2001; Zlatev 2002, 2003). Unlike in reductionist approaches such as that of Lakoff and Johnson (1999) and the similar sounding but very dissimilar in content "memetics" (e.g. Blackmore 1999) mimesis has by definition two of the three crucial features of language: representationality and accessibility to consciousness. This is already obvious in the most concise definition provided by Donald (1991: 168): "Mimetic skills or mimesis rests on the ability to produce conscious, self-initiated, representational acts that are intentional but not linguistic."

In this section I will first introduce the notion as done by Donald in the context of cognitive evolution, and elaborate it somewhat. Then I will relate it to a very similar concept from developmental psychology: Piaget's (1945 [1962]) notion of a *symbol* which plays a crucial role in mediating between the sensorimotor cognition of the infant, and the language-based cognition of the verbal child and adult. On this theoretical basis, I will introduce a relatively novel concept, the *mimetic schema* (Zlatev 2005), and show how it can help resolve the apparent contradiction between embodiment and language that I have argued for so far.



### 5.1. Mimesis in hominid evolution

In Donald's (1991) highly original theory of human origins, early hominids – most likely belonging to the species *Homo ergaster/erectus*, considering the relative jump in brain size and material culture in the hominid line around 2 million years ago – evolved a new form of cognition based on *mimesis*.<sup>10</sup> This allowed our ancestors to use their bodies to perform elaborated actions that others are observed to be doing (imitation), to represent external events for the purpose of communication or thought (pantomime, gesture) and to rehearse a given skill by matching performance to an imagined goal. These are all capabilities which distinguished hominins from the common ape-human ancestor, but which precede language and are thus not dependent on it.

This hypothesis is similar to so-called “gesture theories” of language origins (Stokoe 2001; Corballis 2002). However, it also differs from them, since mimesis lacks at least two properties of language (or even “proto-language”) – full conventionality and systematicity, which are likely to have appeared when vocal calls became recruited for the purpose of disambiguating gestures (Arbib 2003).<sup>11</sup> Thus, mimesis can be seen as serving as a “missing link” in human evolution. Furthermore it has been suggested that mimesis can play a similar role in human ontogenetic development (Nelson 1996; Zlatev 2001, 2003). In order to make the concept more precise and to distinguish it from other evolutionary and developmental theories which also emphasize the role of imitation such as that of Tomasello (1999), the following (re)definition can be given, also adding the adjective “bodily” in order to distinguish bodily mimesis from the broader concept of mimesis with Aristotelean roots (cf. Zlatev, Persson and Gärdenfors 2005).

**(Def) Bodily mimesis:** A particular act of cognition or communication is an act of bodily mimesis if and only if:

---

10. Donald's theory is based on evidence from paleontology, archeology, neurobiology and cognitive psychology, that I will not have the space to present, but Zlatev (2002) and Zlatev, Persson and Gärdenfors (2005) offer a brief exposition of this and other empirical support for the mimetic hypothesis of human origins.

11. The difference between mimesis and a gestural (proto) language, makes mimesis a more likely stepping stone to speech, since if language first emerged in the manual modality, it is difficult to explain why we do not all use sign languages today, i.e. what would force language evolution out the manual-brachial mode.

- (1) It involves a cross-modal mapping between Proprioception and some other modality (**Cross-modality**).
- (2) It consists of a bodily motion that is, or can be, under conscious control. (**Volition**)
- (3) The body (part) and its motion are differentiated from and understood to correspond (either iconically or indexically) to some action, object or event. (**Representation**)
- (4) The subject intends for the act to stand for some action, object or event for an addressee. (**Communicative sign function**)

But it is not an act of bodily mimesis if:

- (5) The act is fully conventional (i.e. a part of mutual knowledge) and breaks up (semi)compositionally into meaningful sub-acts that systematically relate to other similar acts. (**Symbolicity**)

Properties 1 to 5 are assumed to appear in this order in evolution, and logically build on one another. Thus they form an implicational hierarchy:  $1 < 2 < 3 < 4 < 5$ . (If one has higher level properties, one must have lower-level ones, but not vice-versa).

Bodily acts that lack either property 2 or 3 (or both), e.g. crying, are according to the definition not mimetic. On the other hand, signed language possesses property 5 and is excluded as well. However, not all forms of mimesis need fulfill property 4: e.g. pantomime does, but imitation does not. On this basis we can distinguish between two forms of bodily mimesis: *triadic* mimesis which fulfills properties 1–4 in the definition, and *dyadic* mimesis, where 4 is missing. Given the implicational hierarchy, it follows that dyadic mimesis is simpler than triadic mimesis and should precede it in evolution, and possibly also in ontogeny. Indeed, it is by now clear that all great apes (orangutan, gorilla, chimpanzee and bonobo) have the capacity for dyadic mimesis, as shown in e.g. mirror self-recognition (Gallup 1982) and imitation of arbitrary gestures (Custance, Whiten & Bard 1995), though perhaps in less developed form than human beings. What is especially difficult for apes, though, is the understanding that representations can be used *communicatively*, i.e. by the sender and receiver sharing the X–Y (expression-content) mapping. Language-taught apes achieve this with some effort (e.g. Patterson 1980), but there is no clear evidence that it appears spontaneously, the most convincing case being certain “iconic gestures” involving sexual and play invitations in captive apes (Tanner & Byrne 1999).

Thus, what distinguishes our reformulation, and corresponding theory, mostly from that of Donald (1991) is that we hypothesize that it is *triadic*

mimesis that crucially separated *Homo erectus/ergaster* from the common ancestor, allowing a leap in cultural evolution. Triadic imitation implies the understanding of communicative intentions, and in this way our proposal is similar to Tomasello's (1999) suggestion that it is the understanding of others as intentional agents that distinguishes human beings from apes. However, we differ in emphasizing *communicative* intentions, and indeed, recent evidence has granted support to this position, since apes have been shown to understand that others have "psychological states" such as goals, at least in competitive, non-communicative contexts (Tomasello, Call & Hare 2003). On the other hand, understanding a gesture as *corresponding* to something presumably came naturally to our predecessors, as suggested for in the following scenario:

Early humans' eyes and brains would naturally have seen that their hands and their movements pointed directly to other things or reminded them of other things by looking like them. [...] Take for instance a gesture meant by its maker and understood by its watcher to represent "the animal went up the tree". The hand would point at the animal that both individuals had seen and move upward as it pointed to the tree. What the brain would have done – a million or two years ago as now – is interpret the hand's pointing first to mean "that animal" and then to mean "that tree", all the time while interpreting the hand and arm movement as "climbing". (Stokoe 2001: 12)

While Stokoe is probably over-interpreting the degree of differentiation of early representational gesture (in line with his "original gestural language" hypothesis), the quote captures the essence of triadic mimesis quite accurately. Thus, our evolutionary theory proposes that the common ape-human ancestor had the basic potential for dyadic mimesis. It was further selected for as a consequence of living in larger social groups and bipedalism which furthermore provided the niche for the communicative use of bodily representations, i.e. triadic mimesis. Ontogenetic development, as shown in the following subsection, can offer some corroborating evidence to this scenario.

## 5.2. Piaget's epigenetic theory and mimetic schemas

Epigenesis, the co-determination of ontogenetic development by genes and environment leading to a spiral of morphologies, with "lower" states serving as preconditions for "higher" ones, is nowadays nearly unanimously accepted in biology (see Badcock 2000; Zlatev 2003). What makes epi-

genesis even more central for *human* development is the fact that the human infant is born in a highly immature state compared to other mammals. Furthermore the human environment is so culturally rich that “culture” impinges on “nature” to such a degree that it becomes nearly impossible to distinguish between the two (Tomasello 1999). The developmental theory of Piaget (1945, 1953, 1954) is epigenetic in this sense and it can be showed that Piaget presupposed a role for bodily mimesis in ontogenetic development that is analogous to the one envisioned for evolution above, though this seems to have remained hidden due to terminological differences.

Piaget distinguishes between three different kinds of cognitive structures: *sensorimotor schemas*, *symbols* and *signs*, emerging in development in this order. Of the three, the first is best known in the literature, in particular in relation to theories of embodiment. In previous work (Zlatev 1997) I suggested that sensorimotor schemas, which are goal-directed structures of practical activity, can provide the “grounding” of language in experience, thus making them analogous to the “image-schemas” proposed by many cognitive linguists (Johnson & Rohrer *this volume*). As discussed in previous sections, however, this proposal is problematic since sensorimotor schemas are non-representational, while language is representational.

Piaget was very much aware of this difference, and while he acknowledged that sensorimotor schemas play an important part in the “construction of reality for the child”, he claimed that they have inherent limitations, since “sensorimotor activity involves accommodation only to present data, and assimilation only in the unconscious practical form of application of earlier schemas to present data” (Piaget 1945: 278). This prevents them from being representations, since for Piaget, as in the present account, a *representation needs to be (a) accessible to the consciousness of the subject for whom it serves as a representation and (b) differentiated from whatever it represents*, i.e. between the “signifier” and the “signified”, in Saussurean terms. Thus, a qualitatively new stage of development emerges with the attainment of what Piaget calls the *symbolic function*:

This specific connection between “signifiers” and “signified” is typical of a new function that goes beyond sensorimotor activity and that can be characterised in a general way as the “symbolic function.” It is this function that makes possible the acquisition of language or collective “signs,” but its range is much wider, since it also embraces “symbols” as distinct from “signs,” i.e. the images that intervene in the development of imitation, play, and even cognitive representations. (*ibid*: 278)

To understand this quotation, we should emphasize that Piaget is using the term “symbols” in a sense that is very different from what they imply in the Anglo-Saxon world: conventionality, systematicity and arbitrariness. Rather, “symbols” are for Piaget dynamic mental images, more or less vivid in consciousness, representing non-present actions or events. Crucially, both for Piaget and for my argument, they emerge through imitation:

Hence the image is both interiorised sensorimotor imitation, and the draft of representative imitation. [...] It is imitation that has been interiorised as a draft for future exterior imitation, and marks the junction-point between the sensorimotor and the representative. (*ibid*: 279)

Imitation can play this bridging role since it usually emerges through the following ontogenetic progression: *sensorimotor imitation* (the imitated action of the model is contiguous in time) > *deferred imitation* (the imitated action is removed in time) > *representative imitation* – in which “the interior image precedes the exterior gesture, which is thus a copy of an “internal model” that guarantees the connection between the real, but absent model, and the imitative reproduction of it.” (*ibid*: 279)

Two important aspects of Piaget’s account of the rise of representations or “the symbolic function” should be emphasized in the present context. The first is that they arise from an overt, public activity – imitation – which with time becomes *internalized*. This is reminiscent of Vygotsky’s (1978) “law of cultural development” stating that interpersonal forms of higher cognition precede their “intrapersonal” realizations (cf. Lindblom & Ziemke *this volume*). Second, as pointed out above, this makes possible the acquisition of language, which both consolidates and conventionalizes these representations, leading to a new level of cognitive structure: “Verbal representations constitute, in fact, a new type of representation, the conceptual.” (Piaget 1945: 280) In other words these “symbols”, i.e. internalized imitations serve as a “missing link” in the acquisition of language.

The analogy to the role of bodily mimesis in phylogeny should be now obvious. On this basis, as well as a wealth of empirical data provided by Piaget, but also by many others who have studied infant imitation and gesture since then (Bates et al. 1979; Acredolo & Goodwyn 1994; Zlatev 2002), I have proposed a more fitting term for the structures that Piaget is (rather confusingly for the modern reader) calling “symbols”, namely, *mimetic schemas* (Zlatev 2005).

If we refer to the definition of bodily mimesis provided above, we notice that in the case of representative imitation the first three properties: Cross-

modality, Volition and Representation are fulfilled. Thus the covert imitation of a child following its “internal model” in executing an action is at least a case of dyadic mimesis. In order to become triadic, in e.g. pantomime (“baby signs”) what is necessary is to understand *communicative intentions*. This can be seen as a wish to induce others to “activate” in consciousness schemas similar to one’s own. In other words, while Piaget writes of “symbols” (mimetic schemas) as the “signifier” and the actual model as the “signified”, the relation can be reversed, so that a communicative gesture becomes the signifier, while the (shared) mimetic schemas are the “signified” or perhaps in Peircian terms the “interpretant” (cf. Sonesson *this volume*). Let us now summarize some of the properties of mimetic schemas.

Mimetic schemas can be used either *dyadically* (in thought) or *triadically* (in communication).

Mimetic schemas are *experiential*: each schema has a different emotional-proprioceptive “feel”, or affective tone (Thompson 2001) to it. For example, consider the affective contrast between the mimetic schemas KICK and KISS. Thus, mimetic schemas can be regarded as an (important) aspect of phenomenological embodiment.

Mimetic schemas are *representational*: the “running” of the schema is differentiated from the “model event” which is represented – unlike the most common explication given to “image schemas” (Johnson 1987; Johnson & Rorher *this volume*; see Hampe 2005).

Mimetic schemas are, or at least can be *pre-reflectively shared*: since my and your mimetic schemas derive from imitating culturally salient actions and objects, as well as each other, both their representational and experiential content can be “shared” – though not in the strong sense of being known to be shared in the manner of (true) symbols or conventions. They could also be called *egocentric*: “Imitation, with the help of images, provides the essential system of ‘signifiers’ for the purpose of individual or egocentric representation” (Piaget 1945: 279–280). However, it should be remembered that for Piaget, this formulation does not imply that mimetic schemas are private, but rather the contrary: “on the social plane the child is most egocentric at the age in which he imitates most, *egocentrism being failure to differentiate between the ego and the group, or confusion of the individual view-point and that of others*” (*ibid*: 290, my emphasis).

Mimetic schemas can serve as the basis for the acquisition of language in two ways: (a) they constitute the first form of (conscious) internal representation and help lead to the “insight” that others have internal models – a

prerequisite for communicative intentions and (b) they constitute pre-linguistic *concepts*, and in this respect correspond to Mandler's (2004) characterization of "image schemas" but not to that of Johnson and Rohrer (*this volume*; cf. Zlatev 2005).

These properties of mimetic schemas, and particularly the last, can allow us to bridge (or at least minimize) the gap between language and embodiment, as discussed in the final section of this chapter (Section 6), which also retraces the argument presented in this chapter.

## 6. Embodiment regained? Mimetic schemas and language

I started by pointing out three essential properties of (the knowledge of) language: conventionality, representationality and conscious accessibility – and proceeded to see *if*, and if so *how*, they can be made compatible with the currently popular conception that the (human) mind is an "embodied mind". In one of the most influential accounts of "embodiment theory", especially within Cognitive Linguistics, that of Lakoff and Johnson (1999), we saw that these three properties were essentially absent. In what followed I subjected this version of "embodiment" to criticism, and in particular its central concept of the Cognitive Unconscious. While this criticism does not automatically generalize to other accounts, it gives us reasons to worry if embodiment and language can be made compatible, not the least because of the lack a coherent concept of representation. The quest for a more adequate notion of embodiment led us to the work of Donald (1991), and the concept of (bodily) mimesis, which was explicated and related to Piaget's developmental theory. In particular, I argued for the need to acknowledge the concept of mimetic schemas, which among other things:

- are structures of the "lived" (phenomenal, experiential) body, meaning that they are accessible to consciousness;
- are representational structures: they are differentiated from what they stand for, and can be enacted overtly (as pantomime and gesture) or covertly (as mental images);
- can be pre-reflectively shared with others since they (usually) arise from imitation.

But notice that these three characteristics of mimetic schemas correspond to – without being identical – to the three properties of language under focus.

Thus, the following hypothesis concerning the “embodiment” of language can be formulated: *Public linguistic symbols are “embodied” in the sense that part of their meaning is constituted by underlying mimetic schemas.*

If this hypothesis holds true, bodily mimesis can serve not only as a “missing link” between sensorimotor and linguistic cognition in evolution as envisioned by Donald (1991) and in ontogenesis as argued by Piaget – and in rather different ways proposed by Nelson (1996) and Zlatev (2001, 2002) – but as a *conceptual, meta-theoretical* link between embodiment and language. Since language is a central aspect of human sociocultural situatedness, mimetic schemas can help integrate the two major factors that define the human mind – embodiment and situatedness – in a coherent framework.

What else can we offer in support of this hypothesis? A proper treatment of this question would require a separate chapter, so here I only mention the following considerations, to be explored in more detail in the future (cf. also Zlatev 2005):

First, the existence of pre-linguistic but representational mimetic schemas can help solve the puzzle how “socially shared symbolic systems” (Nelson & Shaw 2002) emerge in pre-linguistic children. Since young children lack the meta-linguistic capacity for establishing full-fledged conventions, it is still a mystery how they come from the sensorimotor to the symbolic (i.e. conventional and systematic) level. Mimetic schemas, with their implicit sharing, suggest a way out of this impasse.

Second, a particular difficulty in explaining language acquisition is to account for the learning of actions terms (“verbs”). After having traditionally been considered to follow object terms (“nouns”) in child language (Macnamara 1982), action words have during the past years been shown to arise simultaneously (Tomasello 1992; Nelson 1996), and if they are prominent in parental speech, even to precede nouns in some cases (Gopnik, Choi & Baumberger 1996). It is obvious how mimetic schemas for concrete, imitable actions (e.g. RUN, EAT, SEAT...) can serve as a basis for the acquisition of the corresponding “verbs”. Furthermore, the development of shared representations for objects that can be manipulated such as cups, balls, toys, books, food etc. will be also facilitated, and thus underlie the acquisition of the corresponding “nouns”.<sup>12</sup> Notice that if mimetic

---

12. In the case of objects there is also another means to achieve shared reference, e.g. joint attention (Tomasello 1999), and this would serve to pick out shared perceptual attributes. But there are problems in explaining how this is done,



schemas ground the acquisition of the first words in childhood, the prediction is that the child's early vocabulary will consist of terms such as *run*, *sit*, *eat*, *cat* and *toy*... and this is indeed the case (Nelson 1996; Bloom 2000).

Third, and conversely to helping explain the ease with which children acquire language, and in line with Donald's (1991) original proposal, mimetic schemas may help explain why language acquisition is so difficult even for "enculturated" apes: evolution has given us an adaptation for triadic mimesis supporting advanced imitation and gesture that is beyond the capacities of our nearest relatives in the animal kingdom.

Forth, mimetic schemas as a ground for public symbols can help explain how both "cognitive" (representational) and "affective" (experiential) meaning can be communicated through language, since both aspects can be – to various degrees – shared by communicators, even if the two can be decoupled in abnormal conditions.

Fifth, the close connection of linguistic symbols and mimetic schemas is consistent with the accumulating evidence from experimental psychology and neuroscience showing that language use engages motor representations, as well as the corresponding brain regions (Glenberg & Kaschak 2003; Svensson, Lindblom & Ziemke *this volume*). At the same time, neither this evidence, nor the present proposal implies a stronger form of "language embodiment" in which (practically) all symbolic and inferential processing is carried out by sensorimotor categories and brain regions (Lakoff & Johnson 1999; Johnson & Rohrer *this volume*). If that were the case it would be very hard to explain the qualitative difference between animal and human cognition, in particular with respect to language skills. To emphasize again, according to the present hypothesis, mimetic schemas *ground*, but do not *constitute* linguistic meaning – which as pointed out in Section 2 is conventional in the strong sense: not just shared, but mutually known to be shared.

Sixth, the hypothesis is consistent with the recent enthusiasm surrounding "mirror neurons", which are assumed to support action recognition and imitation, and their role in the evolution of language (Rizzolati & Arbib 1998; Arbib 2003). Since there appears to be a homology between area F5 of the monkey brain where mirror neurons for grasping were originally discovered and Broca's area, it is reasonable to suppose that a developed

---

conceptual (Quine 1960) as well as empirical (Bloom 2000), and thus mimetic schemas for acting on the objects can help pick out the relevant properties.

mirror neuron system constitutes a (partial) “neural correlate” of the ability to form and entertain mimetic schemas.

Seventh, and finally, a long lasting debate in the study of spontaneous co-speech gestures (e.g. McNeill 1992) is whether they are primarily “communicative” or “cognitive”, i.e. whether they are performed for the benefit of the speaker, or for the speaker himself (given that even blind people gesture to each other, as well as more mundanely, people talking on the telephone). If gestures are externalizations of mimetic schemas allows them to be both. The work of Kita and Özyürek (2003), showing the existence of non-linguistic “spatio-motoric representations” that are to some extent influenced by the language of the speaker, fits in naturally with the present proposal.

## 7. Conclusion

In this chapter I have argued for the following set of interrelated theses:

Language is fundamentally a socio-cultural phenomenon, based of grammatical and semantic conventions, and therefore it cannot be reduced to individual minds, and even less so to brains. However, apart from conventionality, language also presupposes *representationality* and *conscious accessibility* and these imply subjectivity.

Qualitative experience is a subjective, “first-person” phenomenon as well as an interpersonal one, involving emotion and affective tone. Thus a truly *experiential* theory of language needs to account for the ability to communicate through linguistic signs which are shared both representationally and phenomenologically.

Theories of embodiment such as that of Lakoff and Johnson (1999) which ignore these characteristics cannot satisfactorily account for language. Since language plays an important role in shaping the human mind, such theories are not capable of accounting for human cognition as well.

The concepts of bodily mimesis, and its derivative concept: mimetic schemas, can help resolve the contradiction between embodiment and language, and thus assist us in the long-term project of (re)integrating body, language and mind.

## Acknowledgments

In writing this chapter, I have benefited from interactions with the other members of the project *Language, Gesture and Pictures in Semiotic Development* at Lund University: Göran Sonesson, Peter Gärdenfors, Tomas Persson, Ingar Brinck, and Sara Lenninger. I would also wish to thank Jörg Zinken, Görel Sandström, Roslyn Frank, Alex Kravchenko, Lars-Åke Henningsson and two anonymous reviewers for comments on various earlier drafts. Finally, I wish to dedicate this essay to my friend Esa Itkonen, for his brave fight for the *true* nature of language against varieties of biophysical reductionism over the past 30 years, i.e. half his life.

## References

- Acredolo, Linda and Susan Goodwyn  
 1994 Sign language among hearing infants: The spontaneous development of symbolic gestures. In: Virginia Volterra and Carol J. Erting (eds.), *From Gesture to Language in Hearing and Deaf Children*, 68–78. Washington, DC: Gallaudet University Press.
- Arbib, Michael  
 2003 The evolving mirror system: A neural basis for language readiness. In: Morten Christiansen & Simon Kirby (eds.) *Language Evolution*, 182–200. Oxford: Oxford University Press.
- Armstrong, David M.  
 1968 *A Materialist Theory of the Mind*. London: Routledge & Kegan Paul.
- Badcock, Christopher  
 2000 *Evolutionary Psychology. A Critical Introduction*. Cambridge: Polity Press.
- Baker, Gordon P. and P.M.S Hacker  
 1984 *Language, Sense and Nonsense: A Critical Investigation into Modern Theories of Language*. Oxford: Basil Blackwell.
- Bates, Elizabeth, Laura Benigni, Inge Bretherton, Luigia Camaioni and Virginia Volterra  
 1979 *The Emergence of Symbols. Cognition and Communication in Infancy*. New York: Academic Press.
- Blackmore, Susan  
 1999 *The Meme Machine*. Oxford: Oxford University Press.
- Bloom, Paul

- 2000 *How Children Learn the Meaning of Words*. Cambridge, Mass.: MIT Press
- Brooks, Rodney
  - 1999 *Cambrian Intelligence: The Early History of the New AI*. Cambridge, Mass.: MIT Press.
- Churchland, Paul M.
  - 1992 *A Neurocomputational Perspective: The Nature of Mind and Structure of Science*. Cambridge, Mass.: MIT Press.
- Clark, Andy
  - 1997 *Being There: Putting Brain, Body, and World Together Again*. Cambridge, Mass.: MIT Press.
- Clark, Herbert
  - 1996 *Using Language*. Cambridge: Cambridge University Press.
- Clark, Herbert and Catherine R. Marshall
  - 1981 Definite reference and mutual knowledge. In: Arivind K. Joshi, Bonnie L. Webber and Ivan A. Sag (eds.), *Elements of Discourse Understanding*, 10–63. Cambridge: Cambridge University Press.
- Corballis, Michael C.
  - 2002 *From Hand to Mouth: The Origins of Language*. Princeton, NJ.; Princeton University Press.
- Custance, Deborah M., Andrew Whiten and Kim A. Bard
  - 1995 Can young chimpanzees (*Pan troglodytes*) imitate arbitrary actions? Hayes & Hayes (1952) revisited. *Behavior* 132: 839–858.
- Cuyckens, Hubert, Dominiek Sandra and Sally Rice
  - 1997 Toward and empirical lexical semantics. In: Birgit Smieja and Meike Tasch (eds.), *Human Contact Through Language and Linguistics*, 35–54. Frankfurt: Peter Lang.
- Damasio, Antonio
  - 1994 *Descartes' Error. Emotion, Reason and the Human Brain*. New York: Grosset/Putnam.
  - 2000 *The Feeling of What Happens. Body, Emotion and the Making of Consciousness*. New York: Harvester.
- de Lafuente, Victor and Ranulfo Romo
  - 2004 Language abilities of motor cortex. *Neuron* 41: 178–180.
- Deacon, Terry
  - 1997 *The Symbolic Species: The Co-Evolution of Language and the Brain*. New York: Norton.
- Donald, Merlin
  - 1991 *Origins of the Modern Mind. Three Stages in the Evolution of Culture and Cognition*. Cambridge, Mass.: Harvard University Press.

- 2001 *A Mind So Rare. The Evolution of Human Consciousness*. New York: Norton.
- Dreyfus, Hubert
- 1972 [1993] *What Computers (Still) Can't Do. A Critique of Artificial Reason*. Third revised edition. Cambridge, Mass.: MIT Press.
- Edelman, Gerald
- 1992 *Bright Air, Brilliant Fire: On the Matter of the Mind*. London: Basic Books.
- Elman, Jerry, F.
- 1990 Finding structure in time. *Cognitive Science*, 14: 179–211.
- Evans, Vyv
- 2003 *The Structure of Time. Language, Meaning and Temporal Cognition*. Amsterdam: Benjamins.
- Fodor, Jerry A.
- 1981 *Representations*. Cambridge, Mass.: MIT Press.
- Frege, Gottlob
- 1882 [1997] On *Sinn* and *Bedeutung*. In: Michael Beaney (ed.), *The Frege Reader*, 151–171. Oxford: Blackwell.
- Freud, Sigmund
- 1949 *An Outline of Psycho-analysis*. London: Hogarth.
- Gallagher, Shaun
- 1995 Body schema and intentionality. In: José Bermúdez, Naomi Eilan, and Anthony Marcel (eds.), *The Body and the Self*, 225–244. Cambridge: MIT/Bradford Press.
  - 2005 *How the Body Shapes the Mind*. Oxford: Oxford University Press.
  - this vol. Phenomenological and experimental contributions to understanding embodied experience.
- Gallup, Gordon G.
- 1982 Self-awareness and the emergence of mind in primates. *American Journal of Primatology* 2: 237–248.
- Garrett, Brain, J.
- 1995 Non-reductionism and John Searle's *The Rediscovery of Mind*. *Philosophy and Phenomenological Research* 55 (1): 209–215.
- Givón, Tom
- 2001 *Syntax, Vol 1–2*. Amsterdam: Benjamins.
- Glenberg, Arthur M. and Michael P. Kaschak
- 2003 The body's contribution to language. In: Brian H. Ross (ed.), *The Psychology of Learning and Motivation* 43: 93–126. San Diego, CA: Academic Press.
- Gopnik, Alison, Soonja Choi and Therese Baumberger

- 1996 Cross-linguistic differences in early semantic and cognitive development. *Cognitive Development* 11 (2): 197–227.
- Gurwitsch, Aron  
1964 *The Field of Consciousness*. Pittsburgh: Duquesne University Press.
- Hampe, Beate (ed.)  
2005 *From Perception to Meaning: Image Schemas in Cognitive Linguistics*. Berlin: Mouton de Gruyter.
- Itkonen, Esa  
1978 *Grammatical Theory and Metascience*. Amsterdam: Benjamins.  
1983 *Causality in Linguistic Theory. A Critical Investigation into the Philosophical and Methodological Foundations of “Non-autonomous” Linguistics*. Bloomington: Indiana University Press.  
1991 *Universal History of Linguistics*. Amsterdam: Benjamins.  
2003 *What is Language?* Turku: University of Turku Press.
- Jackendoff, Ray  
1987 *Consciousness and the Computational Mind*. Cambridge, MA: MIT Press.
- Johnson, Mark  
1987 *The Body in the Mind*. Chicago: University of Chicago Press.
- Johnson, Mark and George Lakoff  
2002 Why cognitive linguistics requires embodied realism. *Cognitive Linguistics* 13 (3): 245–263.
- Johnson, Mark and Tom Rohrer  
this vol. We are live creatures: Embodiment, Pragmatism and the cognitive organism.
- Kita, Sotaro and Asli Özyürek  
2003 What does cross-linguistic variation in semantic coordination of speech and gesture reveal? Evidence for an interface representation of spatial thinking and speaking. *Journal of Memory and Language* 48: 16–32.
- Lakoff, George  
1987 *Women, Fire and Dangerous Things: What Categories Reveal About the Mind*. Chicago: University of Chicago Press.
- Lakoff, George and Mark Johnson  
1980 *Metaphors We Live By*. Chicago: University of Chicago Press.  
1999 *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought*. New York: Basic Books.
- Langacker, Ronald,  
1987 *Foundations of Cognitive Grammar, Vol 1*. Stanford, CA: Stanford University Press.

- Lewis, David K.  
1969 *Convention: A Philosophical Study*. Cambridge MA: Harvard University Press.
- Lindblom, Jessica and Tom Ziemke  
this vol. Embodiment and social interaction: A cognitive science perspective.
- Macnamara, John  
1982 *Names for Things*. Cambridge, MA: MIT Press.
- MacWhinney, Brian  
1999 The emergence of language from embodiment. In: Brain MacWhinney (ed.), *The Emergence of Language*, 213–256. Mahwah, NJ: Lawrence Erlbaum.
- Mandler, Jean  
2004 *The Foundations of Mind: Origins of Conceptual Thought*. Oxford: Oxford University Press.
- Marcus, Gary F.  
2001 *The Algebraic Mind: Integrating Connectionism and Cognitive Science*. Cambridge, Mass.: MIT Press.
- Maslin, Keith  
2001 *An Introduction to the Philosophy of Mind*. Malden, Mass.: Polity Press.
- McNeill, David  
1992 *Hand and Mind: What Gestures Reveal about Thought*. Chicago: University of Chicago Press.
- Merleau-Ponty, Maurice  
1945 [1962] *Phenomenology of Perception*. London: Routledge & Kegan Paul.
- Nelson, Katherine and Lea Kessler Shaw  
2002 Developing a socially shared symbolic system. In: James Byrnes & Eric Amseli (eds.) *Language, Literacy and Cognitive Development*, 27–57. Mahwah, NJ: Lawrence: Erlbaum.
- Nelson, Katherine  
1996 *Language in Cognitive Development. The Emergence of the Mediated Mind*. Cambridge: Cambridge University Press.
- Ogden, C.K. and I.A. Richards  
1923 *The Meaning of Meaning*. London: Routledge and Kegan Paul.
- Palmer, Gary  
1996 *Toward a Theory of Cultural Linguistics*. Austin: The University of Texas Press.
- Patterson, Francis

- 1980 Innovative use of language in a gorilla: A case study. In Katherine Nelson (ed.) *Children's Language, Vol 2*, 497–561. New York: Garden Press.
- Piaget, Jean
  - 1945 *La formation du symbole chez l'enfant*, Neuchâtel–Paris: Delachaux et Niestlé; English translation: G. Gattegno and F. M. Hodgson. *Play, Dreams, and Imitation in Childhood*. New York: Norton, 1962.
  - 1953 *The Origin of Intelligence in the Child*. London: Routledge and Kegan Paul.
  - 1954 *The Construction of Reality in the Child*. New York: Basic Books.
- Pinker, Steven
  - 1994 *The Language Instinct*. New York: William Morrow.
- Quine, Willard V. O.
  - 1960 *Word and Object*. Cambridge, Mass.: MIT Press.
- Regier, Terry
  - 1996 *The Human Semantic Potential: Spatial Language and Constrained Connectionism*. Cambridge, Mass.: MIT Press.
- Rizzolatti, Giacomo and Michael Arbib
  - 1998 Language within our grasp. *Trends in Neurosciences* 21: 188–194.
- Rohrer, Tim
  - 2001 Pragmatism, Ideology and Embodiment: William James and the philosophical foundations of cognitive linguistics. In René Dirven, Bruce Hawkins and Esra Sandikcioglu (eds.), *Language and Ideology: Cognitive Theoretic Approaches: Volume 1*, 49–81. Amsterdam: Benjamins.
  - this vol. The body in space: Dimensions of embodiment.
- Russell, Bernard
  - 1905 On denoting. *Mind* 14: 479–93.
- Saussure, Ferdinand de
  - 1916 *Cours de Linguistique Générale* [Course in General Linguistics]. Paris: Payot.
- Schmidt, Richard
  - 1990 The role of consciousness in second language learning. *Applied Linguistics* 11: 17–46.
- Searle, John
  - 1969 *Speech Acts*. Cambridge: Cambridge University Press.
  - 1992 *The Rediscovery of the Mind*. Cambridge, Mass.: MIT Press.
  - 1999 *Mind, Language and Society. Philosophy in the Real World*. London: Weidenfeld and Nicolson.



- 2002      *Consciousness and Language*. Cambridge: Cambridge University Press.
- Senghas, Ann, Sotaro Kita and Asli Özyürek  
2004      Children creating core properties of language: Evidence from an emerging sign language in Nicaragua. *Science* 305: 1779–1782.
- Sinha, Chris  
1988      *Language and Representation. A Socio-naturalistic Approach to Human Development*. New York: Harvester Press.  
1999      Grounding, mapping and acts of meaning. In: Theo Janssen and Gisela Redeker (eds.), *Cognitive Linguistics: Foundations, Scope and Methodology*, 223–255. Berlin: Mouton de Gruyter.  
2005      Blending out of the Background: Play, props and staging in the material world. *Journal of Pragmatics* (Special issue on Conceptual Blending Theory, guest eds. Seana Coulson and Todd Oakley), 37: 1537–1554.
- Sonesson, Göran  
1989      *Pictorial Concepts*. Lund: Lund University Press.  
this vol.      From the meaning of embodiment to the embodiment of meaning: A study in phenomenological semiotics.
- Stokoe, William C.  
2001      *Language in Hand. Why Sign Came before Speech*. Washington D.C.: Gallaudet University Press.
- Strawson, Peter F.  
1950      On referring, *Mind* 59: 320–344.
- Svensson, Patrik  
1999      *Number and Countability in English Nouns: An Embodied Model*. Uppsala: Swedish Science Press.
- Svensson, Henrik, Jessica Lindblom and Tom Ziemke  
this vol.      Making sense of embodied cognition: Simulation theories of shared neural mechanisms for sensorimotor and cognitive processes.
- Talmy, Len  
2000      *Toward a Cognitive Semantics, Vol I and Vol II*. Cambridge, Mass.: MIT Press.
- Tanner, Joanne E. and Richard W. Byrne  
1999      The development of spontaneous gestural communication in a group of zoo-living lowland gorillas. In: Sue T. Parker, Robert W. Mitchell and H. Lyn Miles (eds.), *The Mentalities of Gorillas and Orangutans – Comparative Perspectives*, 211–239. Cambridge: Cambridge University Press.
- Thompson, Evan

- 2001 Empathy and consciousness, *Journal of Consciousness Studies* 8 (5/7): 1–32.
- Thompson, Evan and Francisco Varela  
2001 Radical embodiment: Neural dynamics and consciousness. *Trends in Cognitive Sciences* 5 (10): 418–425.
- Tomasello, Michael  
1992 *First Verbs: A Case Study of Early Grammatical Development*. Cambridge: Cambridge University Press.  
1999 *The Cultural Origins of Human Cognition*. Cambridge, Mass.: Harvard University Press.
- Tomasello, Michael, Joseph Call and Brian Hare  
2003 Chimpanzees understand psychological states – the question is which ones and what extent. *Trends in Cognitive Sciences* 7 (4): 153–156.
- Trubetzkoy, Nikolay S.  
1939 [1958] *Grundzüge der Phonologie*. Göttingen: Vandenhoeck & Ruprecht.
- Tufvesson, Sylvia, Jordan Zlatev and Joost van de Weijer  
2004 Idiomatic entrenchment and semantic priming, In: Augusto Soares da Silva, Amadeu Torres, Miguel Gonçalves (eds.), *Linguagem, Cultura e Cognição: Estudos de Linguística Cognitiva*, Vol 1: 309–334. Coimbra: Almedina.
- Varela, Francisco  
1996 Neurophenomenology: A methodological remedy for the hard problem. *Journal of Consciousness Studies* 3 (4): 330–350.
- Varela, Francisco, Evan Thompson and Eleonor Rosch  
1991 *The Embodied Mind. Cognitive Science and Human Experience*. Cambridge, Mass.: MIT Press.
- Violi, Patrizia  
2001 *Meaning and Experience*. Translated by Jeremy Carden, Bloomington: Indiana University Press.  
2003 Embodiment at the crossroads between cognition and semiosis. *Reserches en communication* 19: 199–217.
- Vygotsky, Lev S.  
1934 [1962] *Thought and Language*. Cambridge, Mass.: MIT Press.  
1978 *Mind in Society. The Development of Higher Psychological Processes*, Cambridge, Mass.: Harvard University Press.
- Wittgenstein, Ludwig  
1923 [1961] *The Tracatus Logico Philosophicus*. London: Routledge.  
1953 *Philosophical Investigations*. Oxford: Basil Blackwell.
- Ziemke, Tom

- 2003 What's that thing called embodiment? In: Richard Alterman and David Kirsh (eds), *Proceedings of the 25<sup>th</sup> Annual Meeting of the Cognitive Science Society*, 1305–1310. Mahwah, NJ: Lawrence Erlbaum.
- Zlatev, Jordan
- 1997 *Situated Embodiment. Studies in the Emergence of Spatial Meaning*. Stockholm: Gotab Press.
  - 2001 The epigenesis of meaning in human beings, and possibly in robots. *Minds and Machines* 11 (2): 155–195.
  - 2002 Mimesis: The “missing link” between signals and symbols in phylogeny and ontogeny. In: Anneli Pajunen (ed.), *Mimesis, Sign and the Evolution of Language*, 93–122. Publications in General Linguistics 3. Turku: University of Turku Press.
  - 2003 Meaning = Life (+ Culture). An outline of a unified biocultural theory of meaning. *Evolution of Communication* 4 (2): 253–296.
  - 2005 What's in a schema? Bodily mimesis and the grounding of language. In: Beate Hampe (ed.), *From Perception to Meaning: Image Schemas in Cognitive Linguistics*, 313–342. Berlin: Mouton de Gruyter.
- Zlatev, Jordan, Tomas Persson and Peter Gärdenfors
- 2005 Bodily mimesis as “the missing link” in human cognitive evolution. LUCS 121. Lund: Lund University Cognitive Studies.