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Levels of meaning, embodiment and communication

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1. Introduction

The ways in which the (human) body shapes meaning and thought, and the various roles it plays in communication, have received a great deal of attention during the last few decades. However, behind the slogan-like notion of the "embodied mind" lie a plethora of different concepts and theoretical frameworks, and the extent to which they are mutually compatible remains unclear (cf. Ziemke, Zlatev and Frank 2007; Krois et al. 2007).

In this article, focusing on the idea of the embodiment of meaning, I outline four different kinds of embodiment: biological, phenomenological, significational (sign-based) and extended, corresponding to the four major levels of meaning in a particular cognitive semiotic framework, The Semiotic Hierarchy (Zlatev 2009). Since the notion of "communication", with considerably older ancestry than that of embodiment, is even more ambiguous, I then attempt to provide a definition and propose a framework distinguishing between four levels of communication, corresponding to the levels of meaning and embodiment outlined earlier, illustrating these with examples from the comparative and developmental literature.

Some conclusions that can be drawn from this analysis are that a purely biological view of embodiment can only account for the lowest level of communication. By complementing the biological perspective of the body with a phenomenological one (Husserl 1989 [1952]; Merleau-Ponty 1962), focusing on "the lived body" (*Leib*), we can accommodate crucial dimensions of communication such as agency and intention. Furthermore, a phenomenological semiotics can provide us with a notion of *sign* or representation that is not "Cartesian" or "solipsist" in any way, but rather grounded in the acts of the lived body, and furthermore on the roles of symbolic artifacts and external representations (Sinha 1988, 2009; Donald 1991; Sonesson 2007a, 2007b; 2009).

Level- and stage-based analyses, however, remain only descriptive if they cannot tell us anything about the *transitions* between the levels, in either phylogeny or ontogeny. In this respect, the concept of *(bodily) mimesis* (Donald 1991; Zlatev 2005, 2007) can be seen to play an explanatory role. In particular, I will summarize the evolutionary and developmental model of the Mimesis Hierarchy (Zlatev 2008a, 2008b) and suggest that it can help explain the emergence of signification, and possibly even the "highest" levels of meaning and communication going beyond mimesis into conventional/normative representations such as those of language, and (eventually) external(ized) representations.

Finally, I point to a potential danger eminent in focusing too much on the "highest" level of meaning (communication and embodiment): a forgetting, and potentially devaluing of the foundational role of the real, living and lived human body in "bringing forth" a human - and humane - world.

2. Embodiment

2.1. What is "embodiment"?

As often rehearsed these days (e.g. Ziemke et al. 2007; Wallace et al. 2007), the "classical" information-processing paradigm within the cognitive sciences operated with a disembodied notion of the "mind/brain", working similarly to a digital computer (e.g. Chomsky 1965; Fodor 1981; Jackendoff 1983; Pinker 1994). In reaction to this conception and its many problems, the term "embodiment" has been something of a rallying call for those looking, for good reasons, for an alternative. Rhetorically, this is often framed as a "radical" paradigm shift.

> Radical embodiment ... [is] radically altering the subject matter and theoretical framework of cognitive science. (Clark 1999: 22)
> We propose a radically different view. We will argue that conceptual knowledge is embodied, that is, it is mapped within the sensory-motor system. (Gallese and Lakoff 2005: 456)
> Embodied cognition offers a radical shift in explanations of the human mind – a Copernican revolution in cognitive science – you might say, which emphasizes the way cognition is shaped by the body and its sensorimotor interaction with the world. (Lindblom and Ziemke 2007: 129-130).

Unfortunately, however, despite initial optimism (cf. Varela, Thompson and Rosch 1991), a widely accepted, coherent interdisciplinary theoretical framework for the study of human meaning, communication and thinking predicated on the notion of embodiment has not yet come about (cf. Zlatev 2007). The main reason behind this is the vagueness, or rather *ambiguity*, of the term "embodiment" itself. Based on an analysis of the use of the term in the literature(s), the cognitive psychologist Wilson (2002), for example, writes of "six views of embodied cognition" and the cognitive scientist Ziemke (2003) of "six different notions of embodiment", with the two sets only partially overlapping. The cognitive linguist Rohrer (2007: 348) states: "By my latest count the term "embodiment" can be used in at least twelve different important senses with respect to our cognition." Again, the way Rohrer cuts the embodied cake has little to do with the divisions made by Wilson and Ziemke.

Such *non*-convergence of meta-analysis is hardly surprising, since for any consistent "taxonomy" of embodiment, one first needs to ask: *what* (X) is it that is claimed to be embodied in *what* (Y)? The reader of the literature on embodiment will find at least the following terms substituting for the variables in the schema:

> X = mind, language, meaning, concepts, thinking, the self…
> Y = the biological body, robot bodies, neural networks, (sensorimotor areas in) the brain, sensorimotor interactions, image schemas, the cognitive unconscious, the phenomenal body, artifacts, practices, signs…

Related to the problem of ambiguity is that of *overextension*: Are *all* aspects of the (human) mind "embodied", and if so - in the same way? Some strong statements have been made to this effect:

> Image schematic structure is the basis for our understanding of *all* aspects of our perception and motor activities. […] Conceptual Metaphor Theory proposes that *all* abstract conceptualization works via conceptual metaphor, conceptual metonymy, and a few other principles of imaginative extension. (Johnson and Rohrer 2007: 33, 38, my emphasis)

Again, it is not surprising that such claims have been met with skepticism (Haser 2005; Zlatev 2007; Sinha 2009).

2.2 The embodiment of meaning

In my own research (Zlatev 1997, 2003, 2005, 2007, 2009), as well as others (Sinha 1988, 2009, in press; Sonesson 2007a, 2007b; Emmeche 2007) a first step to making the concept of embodiment manageable has been first to narrow down X: *meaning*. Given the philosophical vexations that surround this latter notion, this may at first seem to be a rather unproductive move. However, with the rapprochement of ideas from (bio)semiotics, theoretical biology, phenomenology and "enactive" cognitive science over recent years (Gallagher 2005; Thompson 2007; Brier 2008; Stjernfelt 2008; Zahavi and Gallagher 2008), there are grounds for optimism that a "unified bio-cultural theory of meaning" (Zlatev 2003) may indeed be possible. What follows in the remainder of this section is an outline of one such approach, applied to distinguishing levels of embodiment.

Attempting to synthesize work from cybernetics to linguistics, Zlatev (2003) defined meaning as "the relationship between an *organism* and its *environment*, determined by [...] *value*"[1] (ibid: 258). More recently, this idea has been generalized into the framework of the Semiotic Hierarchy (Zlatev 2009). In brief: meaning exists if and only if there is: (a) *subject* S, (b) a subject-internal *value system* V and (c) a *world* W in which the subject (as being-in-the-world) is embedded. A particular phenomenon within the world (p) will have a given meaning M for S, according to the formulation (which has an expository purpose and should not be taken as indicating that meaning can be "measured") given in (1).

(1) $M(p, S) = W(p) * V(p, S)$

In other words, the meaning of a given phenomenon, for a given subject, will be determined by the "type" of world in which the phenomenon appears *and* the value of the phenomenon for the subject. If either p falls "outside" W, or its value for S is nil, p will be meaningless for S. Depending on the nature of (a), (b), and (c), four levels of meaning can be defined, summarized in Table 1.

Table 1. Summary of the four levels of meaning of The Semiotic Hierarchy (from Zlatev 2009)

Level	Subject	World	Value system
1	*Organism*	*Umwelt*	*Biological*
2	*Minimal self*	*Natural Lebenswelt*	*Phenomenal*
3	*Enculturated self*	*Cultural Lebenswelt*	*Significational (Sign-based)*
4	*Linguistic self*	*Universe of discourse*	*Normative*

2.2.1 The biological body

As proposed originally by von Uexküll (1982 [1940]) the most basic kind of subject S is a biological *organism*, even of the simplest kind. Its world W is that of the *Umwelt* – that part of the larger "environment" which is picked out by a value system V, which is either innately or through learning geared for the survival and reproduction of the organism. Only organisms (living systems), and not artificially created machines, have a set of closely related properties: *autopoiesis* (Maturana and Varela 1980), *identity-world polarity* (Thompson 2007), and an *intrinsic value system* (Edelman 1992), serving their own interests, rather than optimizing some externally defined function. No artificial system has these properties, and hence the only kind of body able to give rise to meaning in a non-metaphorical sense is the living, biological body: meaning is co-extensional with life (cf. Zlatev 2003).

2.2.2 The lived body

However, the subject of biology, the organism, is not necessarily an experiencing subject. The living body is not identical to *the lived (phenomenal) body* (Husserl's *Leib*) (cf. Husserl 1989 [1952]; Merleau-Ponty 1962). The relationship between the organism-subject and the phenomenon (e.g. the "smell" of the animal picked up by the tick in the famous example of von Uexküll), is intrinsically meaningful for the tick, but this is not a sufficient reason to conclude that the tick has subjective experience (*pace* the claims of von Uexküll). At the same time, the proto-intentional relationship inherent in the organism-*Umwelt* polarity, i.e. the *biological directedness* of the organism-subject toward phenomena which it "experiences" (due to its intrinsic value system) as meaningful, even if non-phenomenally, is a plausible ground for the emergence of consciousness (as primitive sentience) in evolution (cf. Popper 1962, 1992; Zlatev 2003; 2009; Thompson 2007).

Thus, on the level of phenomenal value/meaning, there is not only a biologically meaningful *Umwelt*, but a phenomenal *Lebenswelt* in which the subject finds himself immersed. The subject S is here a

[1] Note that the broad notion of *value* employed in (Zlatev 2003, 2009) and in the present article does not necessarily imply either culture or normativity, which apply only to specific (higher) levels of the Semiotic Hierarchy. Alternatively, one could attempt to extend the notion of normativity all the way down to the single biological cell, or even lower to the dynamics of "far-from-equilibrium systems" (Bickhard 2004), but (for reasons that I hope will become apparent) this is not the approach taken here.

"minimal self" (Gallagher 2005), with (at least) affective and perceptual consciousness, which is *intentional* (i.e. directed) towards whatever is perceived. The second sense of "intention", related to agency and volition is related to having a *body image*, unifying (at least) haptic, proprioceptive and visual experience of one's own body (Gallagher 2005), giving "higher animals" (i.e. at least mammals) and infants (at least from 9 months of age) a "sense of self" (Stern 2000 [1985]), being capable of acting purposefully on its surroundings.

2.2.3 The significational body

Non-human animals (without special "enculturation" in a human culture and special programmes of reinforcement) and pre-9 month old-infants are, however, not capable of using and interpreting *signs*, defined as follows[2]:

> A sign is present if and only if E (expression) *signifies* C (content) or at least R (referent), for subject S, so that:

- The relation is ***asymmetrical*** (E → C/R, not C/R ← E)
- E and C/R are ***differentiated***: E is qualitatively different from C/R for S
- E and C/R are ***connected***: in perceiving or enacting E, S indirectly perceives (or conceives of) C/R

This can be illustrated clearly in the case of pictorial signs. Investigating their (possible) understanding by great apes, Persson (2008) distinguishes between (a) "surface mode", in which only the marks of lines and colour are perceived (*Bildding*, in Husserl's terminology), (b) "reality mode", in which the picture is confused with the object it represents (*Sujet*), e.g. a banana and (c) "pictorial mode", in which the *Bildding* is seen as an expression with a certain kind of content (*Bildobjekt*) which can, but need not represent a particular object (*Sujet*). Only in the case of (c) does the subject (in this case, the ape) *see the picture as a sign*. This is clearly a representational relation, mediated by the picture's content. The sign concept of a phenomenological semiotics (Sonesson 1989; 2007a) can be seen as a generalization of this and can involve other semiotic resources such as gestures, symbolic play, pantomime, theatre – and of course language. In all these cases what is directly perceived is "non-thematic" (not focused on by the consciousness of the subject), while what is indirectly perceived (or conceived) is thematic (cf. Sonesson 2006, 2007a).

This concept of the sign, in contrast to a plethora of others, deserves to be called "phenomenological" since it is the consciousness of the subject (S) that makes both the differentiation and the connection possible (Zlatev 2008c, in press). While it is logically possible for "the sign function" to emerge individually, outside of acts of communication, as envisaged by Piaget (1945), signs are typically learned socially, through imitation and communication. They become stable, and eventually conventional (i.e. mutually known) in a "symbolic" culture. Thus, the subject S of this level is an *enculturated subject*, and the world W is not only the directly perceived and acted upon natural *Lebenswelt*, but also a *culturally mediated Lebenswelt*,[3] not replacing, but augmenting the first (cf. Zahavi 2003).

As will be discussed in Section 4, the role of the biological and lived bodies of the previous two levels appears to be fundamental for (the emergence of) signification (sign use) in two ways: through (whole body) imitation (Piaget 1945; Donald 1991; 2001; Zlatev 2007), and the most basic forms of sign use in ontogeny and possibly in evolution: iconic and deictic gestures.

2.2.4. The extended body

[2] The definition is based on what was originally given in Zlatev (2003: 275), but has been elaborated on the basis of influence from Sonesson (1989). Sonesson (2009) elaborates the definition of the sign even further, but I find the present one sufficient for current purposes.

[3] Note, however, that not all aspects of culture imply signification (sign use), cf. Sonesson (2009). Still, signs are the most salient part of human cultures, and thus, as an approximation, a cultural *Lebenswelt* can be said to correspond to a "significational" one.

At the highest level of meaning (and latest in evolution/history and ontogeny), the Lifeworld of subjects as "linguistic selves" is extended to include not only the pre-sign meanings (e.g. those of direct perception) and pre-linguistic signs (e.g. mimetic rituals), but all those denizens of Popper's (1962, 1992) "world 3": cultural beliefs, myths, scientific theories, political ideologies, novels, poems, internet forums, blogs etc. which are made possible by language. This can be called, following Sinha's (2004) use of the concept, "a universe of discourse". A key aspect of meaning on this level, absent (in any fully realized way) earlier is *normativity*: the meanings expressed by language and its many derivative forms are communicated in ways that obey public, commonly known criteria of correctness, or "rules" (Wittgenstein 1953; Itkonen 1978, 2003, 2008; Zlatev 2008a).

But in which way does meaning on this level relate to "embodiment"? Unlike the self-evident role of the body (biological, lived/imagined and significational/expressive) on the previous three levels, it seems that with the ascent of language, and especially external representations such as notions, pictures and diagrams, the role of the human body here is relatively marginal. Thus, in one sense, one can argue that meaning at this level becomes "dis-embodied". But we could also describe this as a matter of "extended embodiment… aspects and features of the experientially or ecologically significant, non-corporeal world" (Sinha and Jensen de López 2000: 24). Normativity is a property not only of language, but of all cultural artifacts (from chairs to bank notes), with their canonical rules (Sinha 1988) and status functions (Searle 1995). Some of these meanings may be analyzed in terms of "cultural affordances" (Sonesson 2009), but others – most clearly (again) notations and diagrams – are (systems of) signs, where the sign vehicles have as Sonesson puts it (2007a, 2007b), metaphorically, "gained a body of their own":

> … as Husserl (1962a: 365-386) recognized in his study of the origin of geometry, for the idealization to be complete, its products have to be "embodied" in some kind of notational system, because only in that way can they gain a stable, public existence in a domain that is completely separate from their instantiations in the practical situations of the Lifeworld. (Sonesson 2007a: 87f)

Thus, an exclusive focus on language and the "universe of discourse" for the highest level of the Semiotic Hierarchy might be misleading, and we could use the term "extended body" to stand for all those modes of meaning and communication that both transcend the limits of human embodiment, and link bodily experience to the wider world of culture, in a global "semiosphere" (Lotmann 1990).

3. Communication in the perspective of cognitive semiotics

3.1 What is "communication"?

Dance and Larson (1976, Appendix A) list 126 different definitions answering this question... In an influential attempt to "clarify this muddy concept by outlining a number of basic elements used to distinguish communication" (Littlejohn 1999: 6), Dance (1970) has singled out three dimensions according to which concepts of communication differ, as discussed by the comprehensive overview volume *Theories of Human Communication* (Littlejohn 1999), from which the definitions (2-7) are taken ibid: 6-7). The first dimension is *generality*, with (2) being (arguably) much too general, and (3) clearly much too concrete. The second dimension is "intentionality", or rather *purposefulness*, with (4) requiring "intent", and (5) not. The third concerns whether definitions *presume accuracy, or success*, of communication, or not. The definition in (6) does so (along with the over-restrictive requirement that interchange be "verbal"), while (7) focuses on the "transmission", but does not require that the message is successfully received or understood.

(2) Communication is the process that links discontinuous parts of the living world to one another. (Ruesch 1956: 462)
(3) The means of sending military messages, orders, etc. as by telephone, telegraph, radio, couriers. (The American College Dictionary 1964: 224).

(4) Those situations in which a source transmits a message to a receiver with conscious intent to affect the latter's behaviors. (Miller 1966: 92)
(5) It is the process that makes common to two or several what was the monopoly of one. (Gode 1959: 5)
(6) Communication is the verbal interchange of a thought or idea. (Hoben 1954: 77)
(7) Communication is the transmission of information. (Berelson and Steiner 1964: 254)

Littlejohn (1999: 7) concludes: "Debates on the definition of communication are perennial." and quotes Dance approvingly: "We are trying to make the concept of 'communication' do too much work for us" (Dance 1970: 210, cited from Littlejohn 1999: 9). In his metatheoretical overview he provides a useful (if often somewhat superficial) division of "theories of communication" into five major groups, or "genres" (a) *structural-functional theories* deriving from system theory, semiotics, linguistics and discourse studies, (b) *cognitive and behavioral theories* from the cognitive and biological sciences, (c) *interactionist theories* from ethnomethodology and related forms of social studies, (d) *interpretive theories* from hermeneutics and phenomenology which "celebrate subjectivism or the preeminence of individual experience" (ibid: 15) and (e) *critical theories*, often based on Marxism, which "focus on issues of inequality and oppression" (ibid: 15). Most importantly, Littlejohn points out the different theories' strengths and weaknesses, and rather than "taking sides" shows that these (usually warring) camps focus on complementary aspects of communication: (a) and (c) on the social-cultural dimension, with (a) zeroing in on structures, while (c) on processes. Both (b) and (d) focus on the individual, but from different perspectives: (b) from the third-person perspective of "objective" observation, while (d) from the first-person perspective, typical for the humanities. Finally, while (a-d) all focus on understanding (and possibly explaining) communication, (e) attempts further to use such knowledge in order to change communicative practices and structures for the better.[4] It is hard not to agree with Littlejohn's conclusion: "These genres are more than theory types. They also embody philosophical commitments and values and reflect the kind of work that different theorists believe is important" (ibid: 16).

Given this diversity, it would be more than naïve to propose a "unified theory of communication", especially in the pages allotted. Still it is tempting to apply the synthetic theory of meaning outlined in the previous section in order to distinguish *levels of communication*, corresponding to the levels of meaning and embodiment presented in the previous section. After all, the ambitions of the emerging school or "genre" of cognitive semiotics, involve precisely the combination of the social-cultural and the individual approaches, the scientific "third-person" and the experiential "first-person" perspectives, as expressed on the home site of the journal with the same name www.cognitivesemiotics.com):

> The first of its kind, *Cognitive Semiotics* is a multidisciplinary journal devoted to high quality research, integrating methods and theories developed in the disciplines of cognitive science with methods and theories developed in semiotics and the humanities, with the ultimate aim of providing new insights into the realm of human signification and its manifestation in cultural practices.

Furthermore, it is my conviction that this is "the kind of the work" that is most "important", i.e. a multidisciplinary (or even "transdisciplinary", Brier 2008) approach, going against ideological borders that leave us with a one-sided (or else incoherent) world-view concerning phenomena lying at the very core of what defines us as human beings: meaning and communication. Thus, I venture to propose a 127th definition of communication, which lies in an intermediary position with respect to Dance's (1970) three dimensions, and Littlejohn's five genres:

[4] Cf. the famous last of Marx's *Theses on Feuerbach* (Marx 1985): "Philosophers have hitherto only interpreted the world in various ways; the point is to change it".

(8) Communication is the transmission of meanings through different (primarily bodily) expressions between two or more subjects.

With respect to generality, it is clearly less abstract than (2) by requiring that the communicating entities be *subjects*, rather than "parts of the living world" such as neurons or hormones. At the same time it is clearly general, rather than domain-specific, such as (3). With respect to "intentionality" it is non-committed, allowing subdivision into intended and non-intended transmission of meanings – in two different ways to be explicated below. As for "success", it uses the (often criticized) notion of "transmission", as in (6), but unlike it, it does not focus solely on the "sender", but on both parties ("between"). Also unlike (6), it does not concern only verbal meaning. At the same time, it does not require in all cases that the sender's *meaning* (rather than "information") to be *identical* with that of the receiver, as in (7), thus allowing for individual interpretation, and collective negotiation.

The potentially most problematic term in the definition is that of "meanings", but given the general meaning theory outlined in Section 2, this is neither used in a general, vague sense, nor is specific to a particular level or type of meaning, e.g. "verbal". In fact, meaning as defined in The Semiotic Hierarchy is a wider concept than communication, since it also involves "phenomena" in the world, especially in the first two levels of *Umwelt* (the meaningful environment) and *Lebenswelt* (the world accessible to consciousness) that are not produced by another subject. For communication in the sense of (8), the phenomenon seen (or understood) as meaningful by one subject is always produced by another subject, without or with volition (the distinction between levels 1 and 2), without or with signification (level 2 vs. level 3), without or with normative value (level 3 vs. level 4). We can use the generic term *communicative signal* for expressions-meanings on all these levels for the sake of convenience.[5]

These levels of communication correspond to those of the Semiotic Hierarchy, and the levels of embodiment described in Section 2. Furthermore, cutting across these levels, divisions can be made, depending on the kind of "materiality" of the communicative signals and the perceptual modalities of their perception. Table 2 summarizes this taxonomy, with categories of communicative signals to be explained in what follows.

Table 2. Levels of communication, corresponding to the four levels of meaning of the Semiotic Hierarchy, and the levels of embodiment (cf. Section 2), with categories of communicative signals from the different communicative modalities, or "channels"

Level	Subject	Embodiment	Bodily-Visible/Haptic	Vocal-Audible	Material-Visible/Audible
1	*Organism*	Biological	Bodily reactions	Cries	Traces
2	*Minimal self*	Phenomenological	Intention-movements, Attention getters	Directed calls	Marks
3	*Enculturated self*	Significational	Gesture, pantomime	"Vocal gestures"	Early picture comprehension
4	*Linguistic self*	Normative/Extended	Signed language	Spoken language	Writing, external representations

3.2.1 Bodily reactions, cries and traces

On the lowest level of the hierarchy, behaviors of a given organism (Subject 1) affect the behavior of Subject 2 (the "receiver"), and thus serve as communicative signals, but are produced by Subject 1 (the "sender") automatically, as part of processes of bodily regulation. Through evolutionary processes

[5] Though note that the terminology in the field differs widely. Clark (1996) uses the term in a way that corresponds to what I would call a "communicative sign" (level 3): "I use the term signal for any action by which one person means something for another person." (ibid: 13), and, for example Tylén (2008), follows this usage. Sinha (2004) on the other hand explicitly contrasts "signals" and "symbols" (corresponding to the distinction of levels 1+2 vs. 3 in the present account).

that are fairly well understood (cf. Hauser 1996), these behaviors were selected not only for their regulative function but also for the way they affect other animals, and thus became communicative without any (necessary) mediation of awareness.

In the "bodily-visible" modality, piloerection (hair-raising) in mammals may be taken as an example of a completely involuntary *bodily reaction*,[6] which was then probably selected in evolution due to the fact that it makes the animal appear larger in size and thus more dangerous to an intruder. Many animal cries, such as dogs' barking, have an analogous role in the vocal-audible modality. While dog owners may give "rich interpretations" to these signals, and through reinforcement dogs can learn to suppress or modulate them, it has recently been convincingly argued that barking is the result of the tension dogs feel when placed in a potentially threatening situation from which they cannot, or will not for conflicting motivations, flee – a reaction that played a key role in their domestication by our ancestors over the past 10,000 years (Lord et al. 2009). Finally, at least partially "extra-bodily" non-volitional communicative signals such as urination – in Table 2 called "traces" – by a variety of territorial animals, including certain fish (Almeida et al. 2005), serve as biological "status" signals to competitors and potential mates.

What is common to these three types of communicative signals is that they serve as "symptoms" of the biological state of S1, "honestly" (sexual status, "mobbing") or not, (size) and are in principle not different for S2 from other aspects of the *Umwelt*. However, there is a complication. With the possible exception of the "chemical communication" of fish in the third example, these communicative signals, while produced completely "unconsciously", i.e. non-voluntarily, involve (almost certainly) phenomenal experience, both in their expression (e.g. the feelings provoking barking) and their "contents", e.g. fear. Thus, they would seem to involve not only basic, *Umwelt*-level meaning, but also a basic, pre-cultural and pre-significational *Lebenswelt*. This is indicative of the difficulties of separating the levels in actual cases, even though the distinctions can be maintained analytically.

3.2.2 Intention movements, attention getters, directed calls and marks

The communicative signals of the next level have been most extensively studied among the non-human primates, and especially the great apes: animals for which the presence of conscious experience and purposive action can hardly be in doubt (cf. Beshkar 2008; Zlatev 2009). Furthermore, the signals discussed here can be shown to be produced with the purpose of influencing the behavior of conspecifics, thus amounting to the definition given in (4). However, while being both "intentional" (i.e. volitional) and "communicative" this does not amount to a strong notion of *intentional communication* (Grice 1989), which requires a higher-level intention: not only to influence the behavior of the receiver, but an intention that the receiver understands the sender's intended meaning, a form of *third-level mentality*: "I wish that you understand that I mean X in producing Y" (Zlatev 2008a). This amounts to an understanding of signification (E stands for C/R, cf. Section 2), which would bring us to the next level of the hierarchy.

While all species of great apes have been shown capable to master signification given special tutoring and human enculturation: chimpanzees and bonobos (Savage-Rumbaugh et al. 1998), gorillas (Patterson 1980) and orangutans (Miles 1990), their spontaneous communicative signals are not true signs and do not amount to "intentional communication" as defined above (Deacon 1997, Tomasello 2008), though that claim has been contested (e.g. Savage-Rumbough 1998).

In the bodily-visual modality, there has lately been considerable interest in "ape gestures" (Call and Tomasello 2007; Pika 2008), and considerable individual and intra-species group variation, implying learning, has been shown. Leavens and colleagues (e.g. Leavens et al. 2008) have documented the widespread presence of spontaneous "pointing" in captive apes of all species, mostly to human

[6] "Piloerection starts when a stimulus such as cold or fright causes a discharge from the (involuntary) nervous system that triggers contraction of the little *arrectores pilorum* muscles. Contraction of these muscles elevates the hair follicles above the rest of the skin so the hair seems to "stands on end."" (MedicineNet.com)

receivers, but also among themselves in some special conditions, e.g. Savage-Rumbough (1986). However, Tomasello (2008, see also Pika 2008) persuasively argues that such "gestures" are qualitatively different from those of children in their second year of life. To put it simply (in the terminology of this paper), while children's deictic and iconic gestures are signs (level 3, see below), those of the apes are not, but can be categorized as either *intention movements* (IMs), *attention getters* (AGs) or a combination of both. IMs arise from so-called ontogenetic ritualization: e.g. a pulling of the other's body in a desired direction becomes toned down to a gentle tug with time, since S2 has learned to respond adequately to the initial part of S1's action, allowing it to become "stylized". Apes also demonstratively understand (even if "non-mentalistically") that the other needs to attend to such IMs for them to be efficient communicative signals, and hence when S2 is facing another direction, S1 will usually produce AGs – either in the bodily-haptic modality (touching, patting) or in the vocal-audible one (calling) in order to gain S2's attention prior to producing IMs. Tomasello (2008) argues that ape pointing, which in non-enculturated individuals is always to desired objects and most often food, arises precisely in this way.[7]

Vocal *calls* as AGs have already been mentioned as an example of communicative signals on this level within the vocal-audible modality. Unlike IMs and non-vocal AGs, however, most ape calls do not seem to be learned ("socially transmitted"), but species-general, "innate" signals, and hence Tomasello (2008) argues that ape bodily-visible communicative signals, and not calls, were the likely stepping stone for the evolution of language: an argument for the "gesture-first" position within the prolonged debate with "speech-first" theorists (cf. Johansson 2005). This is plausible, and consistent with the Mimesis Hierarchy model (see Section 4), but ape (and dolphin) vocal signals are not to be easily dismissed. In the case of the most studied non-human species in primatology, chimpanzees, calls have been shown to be of two types: "broadcast" and "proximal". The first, such as the "food-cry" are high-pitched, not addressed to anyone in particular, apparently involuntary (Deacon 1997), and while their communicative function is often agonistic (pro-social) rather than (only) antagonistic, they seem to be closer to the cries of level 1. The second type of calls are low-pitched, seem to be directed to particular individuals, voluntary produced and intended to have a particular effect, e.g. consoling a distressed relative. It has also recently been shown that the two types lead to different brain-activation patterns: more localized to the right-hemisphere for the directed, proximal calls (Taglialatela et al. 2008).

Also recently, the first case of (seemingly) spontaneous learning of a species-atypical vocal sound by a captive orangutan has been reported, showing "…a new aspect of great ape vocal learning by providing data that an orangutan has spontaneously (without any training) acquired a human whistle and can modulate the duration and number of whistles to copy a human model" (Wich et al. 2008). Therefore, it seems that Tomasello (2008) underestimates the complexity of ape vocal abilities, by treating them basically as a level 1 phenomenon (cries): non-voluntary and unlearned.

However, what was stated in the beginning of this subsection, that both bodily and vocal spontaneous animal signals are not communicative *signs*, remains unchallenged. The calls signaling different types of predators (leopard, eagle, snake) produced by macaques, which received much attention at the beginning of the 1990s, are now nearly unanimously agreed to be "broadcast" signals, serving their communicative functions, without being either learned or intentional (both in the sense of "voluntary" and "directed") to another (cf. Cheney and Seyfarth 2005). Surprisingly, an interesting case for possible spontaneous sign use by non-humans, made by Savage-Rumbaugh (1998) has not received much attention in the literature. It concerns the third type of modality: the external-visible one. During troop migrations, wild bonobos have been observed to break and leave branches at path crossings,

[7] Leavens et al. (2008) object, and protest of double standards for children and apes, but since their theoretical and methodological commitments are to a "methodological behaviorism" (ibid: 191) denying the existence of "mythical" unobservable entities such as intentions (unless they can be publically observed), their view makes it impossible to distinguish the first three levels of communication, and in particular level 2 and level 3. Unsurprisingly, Leavens and colleagues struggle hard to question the existence of *any* cognitive and representational differences between apes and human beings – apart from those that arise due to (public) language (Leavens and Racine 2009).

possibly signaling to other members of the troop following them the direction that they had taken. The suggestion is that given the ecological context (dense vegetation preventing visual contact, predators that would be informed in the case of vocal signaling), this was a strategy consciously chosen by some individual troop members, and then became socially transmitted. If this interpretation were to be confirmed with more cases and better documentation, the branches would be almost literally "pointers" (i.e. deictic signs) fulfilling the conditions for signification and intentional communication given earlier. Unsurprisingly, Tomasello (1999) is skeptical, since breaking tree branches and dragging them is part of the behavioral repertoire of the species, and is used for a variety of "display" functions. Still, this is a good example, if only as a "thought experiment" alerting us that communication "in the wild" could take forms and modalities that are not readily apparent to us. In Table 2, I take (again) an intermediary position between Tomasello and Savage-Rumbaugh, calling the branches along the path *marks*: it is at least possible that the natural branch breaking behavior may become "ritualized" in a particular troop, so that some members voluntarily leave them along the way so as to influence the behavior of those following in a (literally) desired direction, though without involving intentional communication proper, i.e. involving a higher-level intention for their intended meaning to be understood.

3.2.3 Gestures, pantomime, "vocal gestures" and picture comprehension

Given the lack of clear evidence for spontaneous sign use in non-human animals, and the highly circumstantial, and much debated evidence from "bones and stones", for good examples of pre-linguistic, but nevertheless significational meaning and communication, we need to turn to early childhood. To define the border between "prelinguistic" and the "linguistic" child is, of course, not unproblematic. The first words appear around the first birthday, but developmental psychologists from Vygotsky (1962) to the present disagree on whether they are truly "symbolic" (i.e. signs as here defined) rather than "indices" (Piaget 1945), which could be understood as level 2 communicative signals, i.e. associative pairing between a vocalization and a desired object or event. It is first with the "vocabulary spurt" around the middle of the second year, and clearly by 20 months that it is generally uncontested that the child has made his entry into language.

Considering the period between 9 and 18 months, on the other hand, there is indisputable evidence that the (typically developing) child has become a sign user, foremost in the bodily-visible modality (Piaget 1945; Bates, Camaioni and Volterra 1975; Bates 1979; Acredolo and Goodwyn 1990; Carpenter et al. 1998; Liszkowski et al. 2004; Blake et al. 2003). As suggested below (Section 4.2), however, this period can be subdivided in two stages. The child's first bodily communicative signals are also "dyadic" (e.g. raising the hands to express the wish to be picked up) and when "triadic", function as requests for objects. Thus they resemble the "gestures" of the great apes discussed in the previous sub-section. In a recent review, Pika (2008) asks a pertinent question "Gestures of apes and pre-linguistic human children: Similar or different?" and concludes that there are both similarities and differences: "Many human gestures are … used to direct the attention and mental states of others to outside entities… Apes also gesture… but use these communicative means mainly as effective procedures in dyadic interactions to request action from others" (ibid: 131-132). While the ontogenetic progression needs to be more carefully studied, especially in a cross-cultural perspective, it seems that the gestures that are specific for human children and which "direct the attention of others to some third entity, simply for the sake of sharing interest in it or commenting on it" (ibid: 131) appear clearly from about 13-14 months. It is in part a terminological issue, but in Table 2, I reserve the term *gesture* for those (human-specific) bodily expressions which (a) "stand" for a specific meaning, an actual or imagined object, action or event, and (b) in which this sign relationship is intentionally communicated. It is possible to have (a) without (b), as in "private" symbolic play or reenactment, but (b) clearly requires (a). Since the relationship between expression and meaning is not (yet) conventional, there are two ways in which the meaning can be "transmitted": through resemblance (iconic gestures, pantomimes[8]) and declarative (as opposed to imperative) pointing.

[8] There is no clear difference between (preverbal) iconic gestures and (communicative) pantomime: both are performed from a "character viewpoint" rather than an "observer viewpoint" (McNeill 2005) or a "first-person perspective" rather than a "third-person perspective" (Zlatev and Andrén 2009). In other still other terms, they

What about the other two modalities on this level? While this is controversial, I would suggest that prior to the vocabulary spurt around the middle of the second year, the child's first "words" serve a subordinate role to gestural communication, as a supplement to the multimodal communicative signal (Clark 1996). Their conventional referential function is not yet clear to the child and they serve as *"vocal gestures"* – a role more sophisticated than that of directed calls (level 2), but not yet part of a linguistic system (level 4). This is consistant with the growing acceptance of the view of "gesture as the cradle of speech" (cf. Acredolo and Goodwyn 1990; Iverson and Goldin-Meadow 1998; Lock and Zukow-Goldring in press).

Finally, a similar development seems to occur in the modality of external-visual representations during the period 9-20 months. Children's motoric skills are not yet mature in order to be able to produce pictorial signs (i.e. representational drawings) even by the end of this period. But if we look at studies of picture perception and understanding, we find a transition from a "reality mode" (cf. Persson 2008) in which the picture is confused with the object depicted, to the beginning of a "pictorial mode" in which the picture is understood to be a pictorial sign (at least by 18 months), though difficulties in establishing (and maintaining in memory) such so called "dual representation" (cf. DeLoache 2004) persist until the end of the third year, depending on the type of sign vehicle used and on the nature of the experimental paradigm.

3.2.4 Language: signed, spoken and systemic external representations

Following a transitional period of one word utterances supplemented non-redundantly with gestures to form word-gesture combinations (Iverson and Goldin-Meadow 1998), toward the end of the second year most children start quickly becoming increasingly proficient in combining linguistic expressions, and learning their internal relationships. Depending on their social environment more than on their perceptual capacities, this takes place either in the spoken or in "bodily-visible" modality, i.e. they become at first apprentices and eventually masters of either a spoken or a signed language. In some respects this is a "constructive" process (Tomasello 2003), and studies of the spontaneous emergence of Nicaraguan Sign Language (NSL) among deaf school-children who were being taught Spanish through lip-reading and writing (e.g. Senghas, Kita and Özyürek 2004) have shown that children not only spontaneously acquire an existing language, but are capable of co-creating one across several generations ("cohorts") of interacting signers. Still, common to both the "acquisition" and the "construction" perspectives is that what is ultimately established is a "socially-shared symbolic system" (Nelson and Shaw 2002) or a "conventional-normative semiotic system for communication and thought" (Zlatev 2008a). Such definitions of "language" include the two key features distinguishing language from pre-verbal gestures, (from which it gradually emerged in the case of NSL), as well as most representational images: (a) *conventionality*, in the sense of signs and their relations being commonly known and normative (Itkonen 2003, 2008) and (b) *systematicity*, most evident (and studied) on the sentence level as "grammar", but also on the level of discourse.

With literacy, to which children are introduced from 3 to 7 years of age, depending on the educational practices of different (literate) societies, a "universe of discourse" opens up (cf. Section 2.2.4). "Externally embodied" signs, and sign complexes such as (verbal) texts, (complex) pictures, numerical and graphic representations – in various combinations and media – constitute a considerable, if not the major part of the meaningful world for an increasing number of people, in our increasingly technologized societies. At the same time, the "lower" levels of meaning and communication continue to operate in parallel, and it would be both an intellectual mistake, committed by representatives of post-structuralism such as Derrida (1976), and a grave social mistake to de-value them, by either playing down their importance, or else attempting to assimilate them to the higher levels.

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are *enactive* rather than *depictive* (note that a picture is typically produced from an observer viewpoint). It is only with the emergence of language and especially with the "gesture explosion" around 4 years of age (McNeill 2005) that an analytic distinction between co-speech gestures and pantomime becomes necessary.

4. The Mimesis Hierarchy and transitions between the levels

As stated in the introduction, conceptual analyses (with empirical support) of meaning, embodiment and communication such as those presented in the previous two sections may be important as general theoretical frameworks, but they remain fundamentally descriptive, unless complemented with some sort of explanation of the transitions between the different levels. In other words, we need to take either an explicit evolutionary perspective, and consider how qualitatively new forms of meaning and communication *could* have emerged on our planet, or a developmental perspective and study how such changes can take place in children during the first years of life.

Perhaps most difficult is to address the first transition: from biology to experience (sentience, intentionality), but by framing the problem in a way similar to the approach here, i.e. as a "body-body problem" (i.e. the relation between biological body and the phenomenal body), rather than as the classical "mind-body problem", Thompson (2007) has shown that it is both conceptually and empirically tractable (cf. also Zlatev 2009). It is to the next two transitions that I now turn: from experience to signification (sign use), and from there to language, using the concept of bodily mimesis (Zlatev 2005; 2007; 2008a), looking first at evolution and then at development.

4.1. The mimetic origins of signification and language

How did the human capacity for signification (sign use) arise? Apart from differences in language capacity and other forms of sign use, many studies in comparative psychology have established important differences in *imitative capacity* and *intersubjectivity*, i.e. the ability to share and eventually to understand the experiences of others, between us and our closest relatives, the great apes (Donald 1991; Tomasello 1999, 2008; Zlatev et al. 2006; Persson 2008). Table 3 summarizes some of these. As can be seen, chimpanzees (and bonobos when tested) perform more or less similarly to children, except in imitation of action and mutual gaze (between mothers and infants), while gorillas and orang-utans differ in every respect (when tested) except for the recognition of being imitated. This last capacity has very recently been shown even for capuchin monkeys (Paukner et al. 2009).

Table 3. Comparative results concerning sign use (picture comprehension), intersubjectivity (food sharing, contagion, and mutual gaze) and imitation (on actions, and recognition of being imitated) from the SEDSU project: + = positive results, - = negative results, (+) = mixed results, ? = results lacking.

	Children (2 years)	**Chimpanzees**	**Bonobos**	**Gorillas**	**Orangutans**
Picture comprehension	+	+	+	-	?
Imitating actions	+	(+)	?	-	-
Food sharing	+	+	+	-	-
Yawning contagion	?	+	?	-	-
Mutual gaze	+	(+)	(+)	-	?
Recognizing being imitated	+	+	+	+	+

One interpretation consistent with such findings is that the trend for selection of social-cognitive skills in the hominid line gave rise (in early *Homo*) to capacities for intersubjectivity and imitation that are unique in the animal world. These essentially co-evolved and eventually gave rise to bodily signification (Zlatev 2008a, 2008b). Donald (1991) first proposed the general notion of *mimesis* as a "missing link" between ape-like "episodic" cognition and culture, and human "mythic" culture. I have

endeavoured to elaborate this into a model, The Mimesis Hierarchy, consisting of 5 levels (Table 4), which can be seen to follow naturally upon each other, as suggested below.

Table 4. The five levels of The Mimesis Hierarchy (cf. Zlatev 2008a, 2008b)

Level	Characterized by acts which are
Proto-mimesis	- based on a **cross-modal mapping** between exteroception (normally dominated by vision) and proprioception (normally dominated by kinesthetics)
Dyadic mimesis	- under conscious control and **corresponding**– either iconically or indexically – to some action, object or event, and at the same time being **differentiated** from it
Triadic mimesis	- **intended** to stand for some action, object or event for an addressee (and for the addressee to recognize this intention)
Post-mimesis 1 (Protolanguage)	**- conventional-normative**
Post-mimesis2 (Language)	- divided (semi)compositionally into meaningful sub-acts that **systematically** relate to other similar acts (as in grammar)

Proto-mimesis, implicated in acts of mutual attention and the awareness of others' feelings, is shared with many non-human primates, but was further selected for in our "ultra-social" species. This gave rise to distinctively human skills of *dyadic mimesis*, the ability to map between one's own body and that of others in a more detached and differentiated way. This allowed understanding others' emotions, shared attention and (non-communicative) intentions through a (conscious) process of "projection": what would I see/feel/wish if I were you. Still, as shown in Table 3, at least chimpanzees (and bobobos) have some spontaneous capabilities in this respect.

The more qualitative step in human cognitive-semiotic evolution involves *triadic mimesis*, implying having and understanding others' communicative intentions. This requires third-order mentality: "I want you to do X (e.g. share attention on an object) by recognizing my intention that you do this" from the sender's perspective and "I understand that you want me to do X" from the recipient's. Triadic mimesis is clearly difficult for apes to attain, especially in natural conditions. However, through enculturation and especially through extensive sign use, some understanding of communicative intentions seems to be within the reach of apes' "Zone of Proximal Development" (Donald 2001), and thus possibly in the common human-chimpanzee ancestor.

Post-mimesis 1, or protolanguage, which implies some understanding of semantic conventions, could have emerged as typified gestures. Post-mimesis 2, which is identical to language, has on top of everything else the command of a conventional/normative *system* for communication and *thought*. With this level the ultimate payoff of using the same system for communication and thought arises, giving us the cognitive benefits of (logical) reasoning, inference, long-term planning etc. that we take pride in as a species.

Thus, bodily mimesis – in its proto, dyadic and triadic forms – could possibly be a (and possibly *the*) major factor in the evolution of human intersubjectivity and communication. Signification would have been both a result and a driving force in the development of an understanding of third-order mentality, and eventually language. The topic of the evolution of language is currently intensely investigated and hotly debated (cf. Deacon 1997; Christiansen and Kirby 2003; Johansson 2005; Burling 2005; Tomasello 2008). The Mimesis Hierarchy model is in line with "gestural origins" theories (e.g. Donald 1991; Corballis 2002; Arbib 2005; Tomasello 2008). The transition from the manual-brachial to the vocal modality, often presented as a problem for such theories, could have occurred gradually

over 1.5 million years from *H. ergaster* to *H. sapiens* as "vocal gestures" became increasingly recruited to supplement, rather than to replace gestural communication. By the appearance of *H. sapiens* in Africa about 200,000 years ago, this process would have been firmly established, and with this at least the emergence of an integrated gestural-vocal protolanguage (McNeill 2005; Zlatev 2008b). Through processes of cultural, rather than biological, evolution this gave rise to the multitude of languages we know today. Note that this scenario does not assume that *H. erectu*s had "gestural language", since triadic mimesis (pointing and pantomime) lacks the normative aspect inherent in language. Thus, the proposal is less vulnerable to the objection that evolutionary drift would have led to languages with predominantly manual-brachial signs, as in modern signed languages.

4.2 The Mimesis Hierarchy in children's cognitive-semiotic development

The Mimesis Hierarchy can also be interpreted as a stage-model of ontogenetic development (Zlatev and Andrén 2009), as summarized in Table 5. Each of the five successive stages can be defined through the *clear* attainment of a previously unavailable (cognitive) semiotic capacity. Unlike classical stage models in the spirit of Piaget where each consecutive stage brings with it total reorganization[9], this is a "layered model" (Stern 2000 [1985]) where earlier capacities continue to co-exist with newer ones, which subsume but do not abolish their predecessors. Each of the novel capacities defining the different stages typically make their entry somewhat earlier than specified in Table 5, but it takes time before they generalize beyond the first "islands" of use.

Table 5. The stages of the Mimesis Hierarchy, applied to child development

	Label	**Novel capacity**	**Cognitive/communicative skills**	**Approx. age**
1	Proto-mimesis	Mapping between exteroception and proprioception	- emotional and attentional contagion - neonatal imitation - mutual gaze	0-8 m
2	Dyadic mimesis	volition and representation	- imitation - imperative pointing - shared attention	9-13 m
3	Triadic mimesis	communicative signs	- declarative pointing - iconic gestures - (full) joint attention	14-19 m
4	Protolanguage	conventionality/ normativity	- one-word utterances - holophrases	20-27 m
5	Language	semiotic systematicity	- spoken or signed language	28 m-

Stage 1 (*proto-mimesis*) rests on a special form of active perception in which (dynamic) aspects of the environment – especially the actions of con-specifics – are mapped onto one's own bodily actions and sensations. Such "self-other matching" (Barresi and Moore 2008) is well-testified in infants. It makes possible the experience of "human-scale" meaningful physical and social aspects of the Lifeworld, e.g. to distinguish between inanimate objects, animals and persons, and to communicate (above all) affective states, via neonatal imitation (Meltzoff and Moore 1977) and proto-conversations (Trevarthen 1979). Yet, until approximately 8 months of age, this is done without a clear differentiation between self and other, or a sense of agency.

Stage 2 (*dyadic mimesis*) occurs once a "sense of a core self" (Stern 2000 [1985]) in which the body is felt to be "one's own", under *volitional control*, and the self clearly different from others. This seems

[9] This received interpretation of Piaget's developmental model is somewhat simplified, since Piaget recognized that figurative, "preoperational" thinking subsists even in the later "operational" periods.

to take place around the age of 9 months.[10] This makes the lack of direct control of "others' bodies" apparent, and along with that the need to communicate something that is *not* shared to others. This is initially done through communicative signals such as intention movements and attention getters (cf. Section 3.2.2). But increased bodily control, combined with differentiation from others also allows a surge in imitation (of novel actions and events) and with time to use the body as a true *representation* or *sign* of something else, i.e. signification. Piaget (1945) offers the example of an infant opening and closing her mouth to model the opening and closing of a matchbox, which would be an example of an *iconic* correspondence (i.e. based on similarity) between the act and the object of attention. Children's acts of pointing for themselves in order to help guide their attention (Bates, Camaioni and Volterra 1975), emerging around 10-11 months would qualify as *indexical* (and more specifically *deictic*) mimetic acts. But note that neither of these examples is communicative. Children at this stage do begin to point also "imperatively" for others, but even though this is literally "triadic" (since it involves three entities), it does not imply that children are using these gestures as communicative *signs*, expecting that the addressee will understand their (shared) meaning.

Stage 3 (*triadic mimesis*), which (as with the other stages) may begin somewhat earlier, becomes established around 14 months (Bates 1979; Liszkowski et al. 2004; Blake et al. 2003) and introduces precisely this: the intersubjective (self-other matching and differentiation) and representational (expression-content correspondences) abilities developed earlier are merged and become true communicative signs. The three-part relationship between (i) self-initiated mimetic gesture, (ii) its meaning and (iii) the receiver of the intended meaning is what justifies calling this "triadic mimesis". An example of an iconic mimetic sign is the *miming* of an action in addressee-directed "symbolic play". *Declarative pointing*, which is qualitatively distinct from imperative pointing (cf. Section 3.2.3), combines deixis and iconicity, since the motion and direction of the hand resembles the intended direction of attention of the addressee. Signs at this stage may have the same meaning for child and addressee (if communication succeeds), but they are *not known* to have the same meaning.

Stage 4 (*protolanguage*), from approximately 20 to 27 months, brings along a more or less *explicit understanding* (insight) that the meaning of the sign (gesture or word) is common to oneself and the addressee, i.e. the sign's *conventionality*. This is closely related with understanding that there is a "correct" way to express something, i.e. the dawn of a conception of *normativity*. With this, the iconic and/or indexical motivation – or "ground" (Sonesson 2007a) – of the sign loses much of its function, allowing the relationship between expression and content to become increasingly *arbitrary*.[11] The child at this stage engages in a gestural-verbal protolanguage, which still largely lacks grammatical organization. The transition to this stage is marked most clearly by the "vocabulary spurt", which usually starts earlier, but is clear by 20 months.[12]

Finally, Stage 5 (*language*) introduces *semiotic systematicity*, involving hierarchical relations between composite and simple signs (corresponding to what is usually referred to as "compositionality"), and furthermore relations to other signs. This corresponds to the basic mastery of a public language (spoken or signed). Children make this transition at different ages, but 27 months is an approximate average.

Zlatev and Andrén (2009) investigated the development of so-called acts of bodily communication (ABCs) in three Swedish and three Thai children, between 18 and 27 months of age, using a transcribed and video-linked corpus of spontaneous adult-infant interactions. Approximately 1600 such acts were identified over the period, and analyzed using a semiotics-based coding system,

[10] While researchers disagree on its nature, there is considerable agreement for a (qualitative) transition in development around 8-9 months (e.g. Trevarthen and Hubley 1978; Kaye 1982; Tomasello 1999).

[11] Therefore arbitrariness and conventionality are related, but not synonymous notions. In a conventional language such as ASL, up to 50% of signs are more or less iconic (Woll and Kyle 2004).

[12] "At first their rate of vocabulary is very slow, but one typically sees a "burst" or acceleration in the rate of vocabulary growth somewhere between 16-20 months" (Bates 2003: 15).

distinguishing (on the highest level, with sub-categories not discussed here) between *deictic* (DEI), *iconic* (ICO) and *emblematic* (i.e. conventional) (EMB) "components", since one and the same ABC need not include only one type of semiotic ground. One of the most interesting findings of this study was the following:

> When viewing the children from both cultures as a single group, some general developmental patterns appeared. In particular, there was *evidence for a transition around 20 months*, when DEI components (in association with deictic expressions and nominals) peaked, along with a dip in ICO components, and a rather sudden increase of EMB components (consisting to a considerable degree in *nod-yes* and *headshake-no*). (Zlatev and Andrén 2009: 396).

Consistent with the Mimesis Hierarchy model, this is evidence for a transition from triadic mimesis to protolanguage (cf. Table 5 above). Since changes in the measures correlated in time (albeit for the group as a whole), and the transition seemed to be relatively "discrete", the findings can be interpreted as evidence for an *insight* of semiotic normativity, occurring cross-culturally around 20 months. In other words, that children at around this age develop the meta-cognitive awareness that an E(xpression) can not only be used to mean a certain C(ontent), but that it is *appropriately* used in their (mini)culture to do so. The fact that the "vocabulary spurt" typically begins around this time may be (at least in part) a result of this "symbolic insight".

5. Final remarks

At the onset of this decade and century, assessing the status quo within linguistic and philosophical semantics, cognitive science, and my (at that time somewhat sketchy) knowledge of semiotics, I made the following pessimistic pronouncement:

> Our conception of *meaning* has become increasingly fragmented, along with much else in the increasing 'postmodernization' of our worldview. The trenches run deep between different kinds of meaning theories: mentalist, behaviorist, (neural) reductionist, (social) constructivist, functionalist, formalist, computationalist, deflationist… And they are so deep that a rational debate between the different camps seems impossible. The concept is treated not only differently but *incommensurably* within the different disciplines (Zlatev 2003: 253).

This served as the motivation for attempting to formulate "an outline of a unified bio-cultural theory of meaning", giving a foundational place to life (rather than machines), and proposing "hierarchies" of meaning in evolution and development, which in a broadly continuous framework could also accommodate qualitative changes. At that time, my ambitions seemed somewhat premature, but since then, several impressive attempts at providing integrational theories of meaning have been proposed (Emmeche 2007; Sonesson 2007a; Stjernfelt 2007, Brier 2008) as well as a rapprochement between phenomenology and cognitive science (Thomspon 2007; Gallagher and Zahavi 2008; Schmicking and Gallagher in press). The appearance of the journal *Cognitive Semiotics* on the scene can be seen as a reflection of the same need to counter the fragmentation described in the quotation above. The Semiotic Hierarchy (Zlatev 2009) and its extension to the notion of "embodiment" and communication explored in this chapter are in line with these developments. There are both similarities and differences between my proposals and those of colleagues, but these are to be explored in some other context.

I wish to conclude by emphasizing what seems common to all those mentioned in the previous paragraph – an effort to assert "the primacy of the body", but without falling into any form of biological reductionism in which the body (with focus on the brain) is treated as kind of physical object, a sophisticated machine. Another common motivation in theoretical frameworks such as the present one, as well as "embodied dynamism" (Thompson 2007) and "cybersemiotics" (Brier 2008) is a desire to point out that "higher levels" of meaning, communication and intersubjectivity presuppose lower ones: evolutionarily, developmentally, but also "synchronically". Meaning and communication are *rooted* in the biological, lived and significational bodies interacting with their respective "worlds" (cf. Table 1). This is important since neglecting it in theorizing leads to distorted accounts involving at

one extreme beliefs in innate "language organs", and at another extreme, claims that "everything is a text".

Still much worse would be to neglect and devalue the body *in practice*: a cultural devaluing of the living and lived body in an over-technological society and "globalized" world. This could potentially lead to the experience of a vacuum of meaning, breakdown of communication, and ultimately self-destruction, on the individual or societal levels. The recent film *Babel* (2006) by the director Alejandro González Iñárritu portrays exactly this: how we are separated and antagonized by differences of language, custom, arbitrary norms, how a particular "cultural artefact" (a rifle) given as a token of gratitude turns into, by chance, the cause of mutual misery, how physical our suffering is as the result of torture, thirst, bullet wounds, suppressed sexuality... – but also how united we are as human beings in this suffering, and how our bodies are ultimately the only means of reaching out, and caring.

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References

Acredolo, L. and Goodwyn, S. (1990). Sign language among hearing infants: The spontaneous development of symbolic gestures. In V. Volterra and C.J. Erting (Eds.), *From Gesture to Language in Hearing and Deaf Children,* 68-78. Berlin: Springer.

Almeida, O.G., Miranda, A., Frade, P., Hubbard, P.C., Barata, E.N. and Canário, A.V.M. (2005) Urine as a Social Signal in the Mozambique Tilapia (*Oreochromis mossambicus*), *Chemical Senses* 30 (suppl 1): i309–i310, 2005

Barresi, J. and Moore, C. (2008). The neuroscience of social understanding. In J. Zlatev, T. Racine, C. Sinha, and E. Itkonen, *The Shared Mind: Perspectives on Intersubjectivity*, 39-66. Amsterdam: Benjamins.

Bates, E. (1979) *The Emergence of Symbols. Cognition and Communication in Infancy.* New York: Academic Press.

Bates, E. (2003) On the nature and nurture of language. UCSD, Unpublished report.

Bates, E., Camaioni, L., and Volterra, V. (1975). Performatives prior to speech. *Merrill-Palmer Quarterly* 21: 205-226.

Berelson, B., & Steiner, G. (1964). *Human Behavior.* New York: Harcourt, Brace and World.

Beshkar, M. (2008). Animal consciousness. *Journal of Consciousness Studies , 15* (3), pp. 5-34.

Bickhard**,** M. H. (2004). Process and emergence: Normative function and representation. *Axiomathes - An International Journal in Ontology and Cognitive Systems* 14:135-169.

Blake, J., Osborne, P., Cabral; M. and Gluck, P. 2003. The development of communicative gestures in Japanese infants. *First Language* 23(1): 3-20.

Brier, S. (2008). *Cybersemiotics: Why Information is not Enough.* Toronto: University of Toronto Press.

Burling, R. (2005). *The Talking Ape.* Oxford: Oxford University Press.

Call, J., & Tomasello, M. (2007). *The Gestural Communication of Apes and Monkeys.* Mahwah, NJ: Lawrence Erlbaum.

Carpenter, M., Nagell, K., & Tomasello, M. (1998). *Social cognition, joint attention, and communicative competence from 9 to 15 months.* Monographs of the Society of Research in Child Development 63(4).

Cheney, D. L., & Seyfarth, R. M. (2005). Constraints and preadaptations in the earliest stages of language evolution. *Linguistic Review , 22*, pp. 135-159.

Clark, A. (1999.). An embodied cognitive science? *Trends in Cognitive Sciences , 3* (9), pp. 345-351.

Chomsky, N. (1965). *Aspects of a Theory of Syntax.* Cambridge, Mass.: MIT Press.

Christiansen, M. & Kirby, S. (2003). *Language Evolution.* Oxford: Oxford University Press.

Clark, H. H. (1996). *Using Language.* Cambridge: Cambridge University Press.

Corballis, M. C. (2002). *From Hand to Mouth: The Origins of Language.* Princeton, NJ: Princeton University Press.

Dance, F. E. (1970). The "concept" of communication. *Journal of Communication , 20*, pp. 201-220.
Dance, F. E., & Larson, C. E. (1976). *The Foundations of Human Communication: A Theoretical Approach.* New York: Holt, Rinehart & Winston.
Deacon, T. (1997). *The Symbolic Species: The Co-evolution of Language and the Brain.* New York: Norton.
DeLoache, J.S. (2004). Becoming symbol-minded. *Trends in Cognitive Sciences* 8: 66–70.
Derrida, J. (1976). *Of Grammatology.* Baltimore: John Hopkins University Press.
Donald, M. (1991). *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition.* Cambridge, Mass.: Harvard University Press.
Donald, M. (2001). *A Mind so Rare: The Evolution of Human Consciousness.* New York: Norton.
Edelman, G. (1992). *Bright Air, Brilliant Fire: On the Matter of the Mind.* New York: Basic Books.
Emmeche, C. (2007). On the biosemiotics of embodiment and our human cyborg nature. In T. Ziemke, J. Zlatev, & R. Frank, *Body, Language, Mind: Volume 1, Embodiment* (pp. 411-430). Berlin: Mouton de Greyter.
Fodor, J. A. (1981). *Representations.* Cambridge, Mass.: MIT Press.
Gallese, V., & Lakoff, G. (2005). The brain's concepts: The role of the sensori-motor system in conceptual knowledge. *Cognitive Neuropsychology , 22*, pp. 445-479.
Gallagher, S. (2005). *How the Body Shapes the Mind.* Oxford: Oxford University Press.
Gallagher, S., & Zahavi, D. (2008). *The Phenomenological Mind: An Introduction to Philosophy of Mind and Cognitive Science.* London: Routledge.
Gode, A. (1959). What is communication. *Journal of Communication , 9*, pp. 3-20.
Grice, P. (1989). Meaning. In *Studies on the Way of Words* (pp. 213-223). Harvard: Harvard University Press.
Haser, V. (2005). *Metaphor, Metonymy and Experientialist Philosophy.* Berlin: Mouton de Gruyter.
Hauser, M. D. (1996). *The Evolution of Communication.* Cambridge, Mass: MIT Press.
Hoben, J. B. (1954). English communication at Colagte Re-examined. *Journal of Communication , 4*, pp. 72-92.
Husserl, E. (1989 [1952]). *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, Second Book.* Dordrecht: Klewer.
Itkonen, E. (1978). *Grammatical Theory and Metascience: A Critical Inquiry into the Philosophical and Methodological Foundations of "Autonomous" Linguistics* . Amsterdam: Benjamins.
Itkonen, E. (2003). *What is Language? A Study in the Philosophy of Linguistics.* Turku: Turku University Press.
Itkonen, E. (2008). The central role of normativity for language and linguistics. In J. Zlatev, T. Racine, C. Sinha, & E. Itkonen, *The Shared Mind: Perspectives on Intersubjectivity,* 279-306. Amsterdam/Philadelphia: Benjamins.
Iverson, J.M. and Goldin-Meadow, S. (1998). *The Nature and Functions of Gesture in Children's Communication*. San Fransisco: Jossey-Bass Publishers.
Jackendoff, R. (1983). *Semantics and Cognition.* Cambridge, Mass.: The MIT Press.
Johnson, M., & Rohrer, T. (2007). We are live creatures: Embodiment, American Pragmatism and the cognitive organism. In T. Ziemke, J. Zlatev, & R. Frank, *Body, Language and Mind. Vol 1: Embodiment* (pp. 17-54). Berlin: Mouton de Gruyter.
Johansson, S. (2005). *Origins of Language: Constraints on Hypotheses.* Amsterdam: Benjamins.
Kaye, K. (1982). *The Mental and Social Life of Babies: How Parents Create Persons*. Chicago: University of Chicago Press.
Krois, J. M., Rosengre, M., Steidele, A., & Westerkamp, D. (2007). (Eds.) *Embodiment in Cognition and Culture.* Amsterdam: Benjamins.
Leavens, D. A., & Racine, T. (2009). Joint attention in apes and humans: Are humans unique? *Journal of Consciousness Studies , 16* (6-8), pp. 240-267.
Leavens, D. A., Hopkins, W. D., & Bard, K. A. (2008). The heterochronic origins of explicit reference. In J. Zlatev, T. Racine, C. Sinha, & I. Itkonen, *The Shared Mind: Perspectives on Intersubjectivity* (pp. 187-214). Amsterdam: Benjamins.
Lindblom, J., & Ziemke, T. (2007). Embodiment and social interaction: A cognitive science perspective. In T. Ziemke, J. Zlatev, & F. R, *Body, Language and Mind. Vol 1: Embodiment* (pp. 129-163). Berlin: Mouton de Gruyter.

Liszkowski, U., Carpenter, M., Henning, A., Striano, T., and Tomasello, M. (2004). Twelve-month-olds point to share attention and interest. *Developmental Science* 7: 297–307.

Littlejohn, S. E. (1999). *Theories of Human Communication.* Belmont, CA: Wadsworth Publishing Company.

Lock, A and Zukow-Goldromh. P. (in press) Prelinguistic communication. In G. J. Bremmer and T. D. Wachs (Eds) *Handbook of Infant Development, Second Edition*. Oxford: Blackwell.

Lotman, Y. (1990). *Universe of Mind. A Semiotic Theory of Culture.* New York: I.B. Tauris and Co.

Lord, K., Feinstein, M. and Coppinger, R. (2009) Barking and mobbing. *Behavioural Processes* 81 (3): 358-368.

McNeill, D. (2005). *Gesture and Thought.* Chicago: University of Chicago Press.

Maturana, H., & Varela, F. (1980). *Autopoiesis and Cognition - The Realization of the Living.* Dordrecht: Reidel.

Meltzoff, A.N. and Moore, M.K. (1977). Imitation of facial and manual gestures by human neonates. *Science* 198: 75-78.

Merleau-Ponty, M. (1962 [1945]). *Phenomenology of Perception.* London: Routledge.

Miles, H. L. (1990). The cognitive foundations for reference in a signing orangutan. In S. T. Parker, & K. R. Gibdon, *"Language" and Intelligence in Monkeys and Apes* (pp. 511-539). Cambridge: Cambridge University Press.

Miller, G. R. (1966). On defining communication: Another look. *Journal of communication , 16*, pp. 90-112.

Nelson, K. and Shaw, L. K. (2002). Developing a socially shared symbolic system. In *Language, Literacy and Cognitive Development,* J. Byrnes and E. Amseli (eds.), 27-57. Hillsdale, NJ: Lawrence Erlbaum

Patterson, F. (1980). Innovative use of language in a gorilla: A case study. In K. Nelson, *Children's Language. Vol. 2* (pp. 497-561). New York: Garnder Press.

Paukner, A. Suomi, S.J. Visalberghi, E., Ferrari, P.F. (2009) Capuchin monkeys display affiliation toward humans who imitate them, *Science* 325 (5942) pp. 880 – 883.

Persson, T. (2008). *Pictorial Primates: A Search for Iconic Abilities in Great Apes.* Lund: Lund University Cognitive Studies, 136.

Piaget, J. (1945). *La formation du symbole chez l'enfant.* Delachaux et Niestlé.

Pika, S. (2008) Gestures of apes and pre-linguistic human children: Similar or different? *First Language* 28 (2): 116-140.

Pinker, S. (1994). *The Language Instinct.* New York: William Morrow.

Popper, K. (1962). *Objective Knowledge.* Oxford: Oxford University Press.

Popper, K. (1992). *In Search of a Better World: Lectures and Essays from Thirty Years.* London: Routledge.

Ruesch, J. (1957). Technology and social communication. In L. Thayer, *Communication Theory and Research.* Springfield, IL: Thomas.

Savage-Rumbaugh, S. (1998). Scientific schizophrenia with regard to the language act. In J. Langer, & M. Killen, *Piaget, Evolution and Development* (pp. 145-169). Mahwah, NJ: Erlbaum.

Savage-Rumbaugh, S. (1998). Scientific schizophrenia with regard to the language act. In J. Langer, & M. Killen, *Piaget, Evolution and Development* (pp. 145-169). Mahwah, NJ: Erlbaum.

Schmicking, D. and Gallagher, S. (in press) (Eds.), *Handbook of Phenomenology and Cognitive Sciences*. Dordrecht and New York: Springer, 2009.

Searle, J. (1995). *The Construction of Social Reality.* London: Allen Lane.

Senghas, A., Kita, S. and Özyürek, A. (2004). Children creating core properties of language: Evidence from an emerging sign language in Nicaragua. *Science* 305: 1779-1782.

Sinha, C. (1988). *Language and Representation. A Socio-naturalistic Approach to Human Development.* New York: Harvester Press.

Sinha, C. (2004). The evolution of language: From signals to symbols to system . In D. Kimbrough, & U. Griebel, *Evolution of Communication Systems: A Comparative Approach* (pp. 217-235). Cambridge, MA: MIT Press.

Sinha, C. (2009). Objects in a storied world: Materiality, Normativity, Narrativity. *Journal of Consciousness Studies , 16* (6-8), pp. 167-190.

Sinha, C. (in press). Language as a biocultural niche and social institution. In V. Evans, & S. Pourcel, *New Directions in Cognitive Linguistics.* Amsterdam: John Benjamins.

Sinha, C., & Lopéz, J. d. (2000). Language, culture and the embodiment of spatial cognition. *Cognitive Linguistics , 11* (1-2), pp. 17–41.

Sonesson, G. (1989) *Pictorial concepts*. Lund: Lund University Press.

Sonesson, G. (2007a). From the meaning of embodiment to the embodiment of meaning: A study in phenomenological semiotics. In T. Ziemke, J. Zlatev, & R. Frank, *Body, Language and Mind,* 85-127. *Vol 1: Embodiment.* Berlin: Mouton de Gruyter.

Sonesson, G. (2007b). The extensions of man revisited. From primary to tertiary embodiment. In J. M. Krois, M. Rosengre, A. Steidele, & D. Westerkamp, *Embodiment in Cognition and Culture* (pp. 27-56). Amsterdam: Benjamins.

Sonesson, G. (2009). New Considerations on the Proper Study of Man - and, marginally, some other Animals. *Cognitive Semiotics , 4*.

Stern, D. N. (2000 [1985]). *The Interpersonal World of the Infant: A View from Psychoanalysis and Developmental Psychology.* New York: Basic Books.

Stjernfelt, F. (2007). *Diagrammatology.* Dordrecht: Springer.

Taglialatela, J.P., Russell, J.L., Schaeffer, J.A. and Hopkins, W.D. (2009). Visualizing vocal perception in the chimpanzee brain. *Cerebral Cortex* 19(5):1151-1157.

Tomasello, M. (1999). *The Cultural Origins of Human Cognition.* Cambridge, Mass.: Harvard University Press.

Tomasello, M. (2003). *Constructing a Language. A Usage-based Theory of Language of Language Acquisition.* Cambridge, MA: Harvard University Press.

Tomasello, M. (2008). *Origins of Human Communication.* Cambridge, Mass.: MIT Press.

Thompson, E. (2007). *Mind in Life: Biology, Phenomenology and the Sciences of Mind.* Cambridge, MA: Harvard University Press.

Trevarthen, C. 1979. Communication and cooperation in early infancy: A description of primary intersubjectivity. In M. Bullowa (Ed.), *Before speech*, 321-347. Cambridge: Cambridge University Press.

Trevarthen, C. and Hubley, P. (1978). Secondary intersubjectivity: Confidence, confiding and acts of meaning in the first year. In A. Lock (Ed.), *Action, Gesture and Symbol: The Emergence of Language,* 183-229. London: Academic Press.

Tylén, K. (2008). *Roses, Icebergs, Hoovers and all that Language. An investigation of the cognitive foundations of our comprehension of object mediated communication.* Ph.D Thesis: Odense: University of Southern Denmark.

Varela, F., Thompson, E., & Rosch, E. (1991). *The Embodied Mind.* Cambridge, Mass.: The MIT Press.

von Uexküll, J. (1982 [1940]). The theory of meaning. *Semiotica , 42* (1), pp. 25-82.

Vygotsky, L.S. (1962 [1934]). *Thought and Language.* Cambridge, Mass.: The MIT Press.

Wallace, B., Ross, A., Davies, J., & Anderson, T. (2007). *The Mind, the Body and the World. Psychology after Cognitivism?* Exeter, UK: Imprint Academic.

Wich, S.A., Swartz, K.B., Hardus, M.E., Lameira, A.R., Stromberg, E. and Shumaker, R.W. (2009). A case of spontaneous acquisition of a human sound by an orangutan. *Primates* 50:56–64.

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin and Review , 12* (4), pp. 625-636.

Wittgenstein, L. (1953). *Philosophical Investigations.* Oxford: Basil Blackwell.

Woll, B. and Kyle, J.(2004). Sign language. *Encyclopedia of language and linguistics.* Oxford: Elsevier.

Zahavi, D. (2003). *Husserl's Phenomenology.* Stanford: Stanford University Press.

Ziemke, T. (2003). What's that thing called embodiment? In R. Alterman, & D. Kirch, *Proceedings of the 25th Annual Meeting of the Cognitive Science Society* (pp. 1305-1310). Mahwah, NJ: Lawrence Erlbaum.

Ziemke, T, Zlatev, J. & Frank, R. (2007) (Eds.) *Body, Language and Mind. Vol 1: Embodiment.* Berlin: Mouton de Gruyter.

Zlatev, J. (1997). *Situated Embodiment: Studies in the Emergence of Spatial Meaning.* Stockholm: Gotab.

Zlatev, J. (2003). Meaning = Life + (Culture): An outline of a unified biocultural theory of meaning. *Evolution of Communication , 4* (2), pp. 253-296.

Zlatev, J. (2005). What's in a schema? Bodily mimesis and the grounding of language. In B. Hampe, *From Perception to Meaning: Image Schemas in Cognitive Linguistics* (pp. 313-343). Berlin: Mouton de Gruyter.

Zlatev, J. (2007). Embodiment, language and mimesis. In T. Ziemke, J. Zlatev, & R. Frank, *Body, Language and Mind. Vol 1: Embodiment,* 297-337. Berlin: Mouton de Gruyter.

Zlatev, J. (2008a). The co-evolution of intersubjectivity and bodily mimesis. In J. Zlatev, T. Racine, C. Sinha, & E. Itkonen, *The Shared Mind: Perspectives on Intersubjectivity,* 215-244. Amsterdam: Benjamins.

Zlatev, J. (2008b). From proto-mimesis to language: Evidence from primatology and social neuroscience. *Journal of Physiology, Paris,* 102: 137-152.

Zlatev, J. (2008c). The dependence of language on consciousness. *Journal of Consciousness Studies , 15* (6), pp. 34-62.

Zlatev, J. (2009). The Semiotic Hierarchy: Life, Consciousness, Signs, Language. *Cognitive Semiotics , 4*: 169-200

Zlatev, J. (in press). Cognitive linguistics and phenomenology and D. Schmicking and S. Gallagher (Eds.), *Handbook of Phenomenology and Cognitive Sciences*. Dordrecht and New York: Springer, 2010.

Zlatev, J., & Andrén, M. (2009). Stages and transitions in children's semiotic development, XX-XX. In J. Zlatev, M. Andrén, M. Johansson-Falck, & C. Lundmark, *Studies in Language and Cognition.* Newcastle: Cambridge Scholars Publishing.

Zlatev, J., & SEDSU-Project. (2006). Stages in the Evolution and Development of Sign Use (SEDSU). In A. Cangelosi, A. D. Smith, & K. Smith, *The Evolution of Language: Proceedings of the 6th International Conference (EVOLANG6)* (pp. 379-388). New Jersey: World Scientific.

Zlatev, J., Racine, T., Sinha, C., & Itkonen, E. (2008) (Eds.). *The Shared Mind: Perspectives on Intersubjectivity.* Amsterdam/Philadelphia: Benjamins.