**Transformative Communication as Semiotic Scaffolding of Cognitive Development**

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***Abstract:*** The paper examines the role of earliest communicative interactions in the development of social-cognitive functions through a communication-theoretical interpretation of Hoffmeyer’s notion “semiotic scaffolding”. Drawing on Bateson’s notion of metacommunication and Vygotskian perspectives on cognitive-semiotic development, it argues that the primary semiotic achievement of human evolution and development is the differentiation of meaning into inter-referential layers that are communicatively established, which in turn provides an ecological foundation for multilevel and multimodal semiosis. Ontogenetically regarded, differentiation of levels of communication is argued to be an intersubjectively achieved process of semiotic scaffolding. Semiotic scaffolds are conceived as hierarchically organized, temporary or enduring semiotic controls on action, which can be formed in phylog- eny or ontogeny. The timescale in which semiotic scaffolds change narrows down from phylogenic history to lived time to the extent that development is mediated by culture. The increasing plasticity of semiotic scaffolds brings about a novel, transfor- mative mode of communication that is partly efficacious on phylogenetic scaffolding and responsible for the emergence of higher order scaffolds within ontogenetic time. Transformative communication is the process whereby higher-order semiotic scaffolds of (inter)action are intersubjectively formed by effectuating a top-down social modification on the psycho-somatic level of scaffolding. Its phylogenetically prior and more pervasive correlative, coordinative communication, is the mode in which stably scaffolded semiotic activities of individuals are coordinated. This argument is concretized through examining some landmark cognitive-semiotic activities such as imitation, cooperative role-taking and symbolic play, interpreted as communicative interactions with particular focus on their role in layering sign- processes. Through these interactions the child develops skills for differential attention to sign-object-interpretant and coordination of alternative interpretants.

***Keywords:*** semiotic scaffolding, metasemiosis, metacommunication, perspective taking, metacognition, semiotic development

**Introduction**

Communication and cognition have an affinity which appears almost self-evident when approached from a semiotic perspective: they both involve meaning-making on the basis of sign processes.

In line with a long-lived philosophical tradition inaugurated by Plato that envisioned thought as internal dialogue (c.360 BCE: *Sophist* 263e), Peirce conceives the movement of thought to be communicational in nature, where the mediator, the sign, reflects the nature of the process in its uni- fied two-sidedness:

signs require at least two quasi-minds; a Quasi-utterer and a Quasi- interpreter; and although these two are at one (i.e., are one mind) in the sign itself, they must nevertheless be distinct. In the sign they are, so to say, welded. Accordingly, it is not merely a fact of human Psychology, but a necessity of Logic, that every logical evolution of thought should be dialogic. (1906: CP 4.551)

While for Peirce the operation of mind is communicational in form and origin, “cognition is the development of available semiotic material artifacts in which it is embodied as a power to produce interpretants” (Atã and Queiroz 2014: 1). Herbert Mead follows Peirce in anchoring the devel- opment of mind and self to communicational and quasi-communicational processes mediated by “significant symbols”; e.g., signs which manifest two-sides of the social act in their material constitution (Mead 1934).

The developmental question from a semiotic perspective turns into the question as to how the sign processes and systems underlying both com- munication and cognition come about. This, we can clearly say, is among the most central research questions addressed by the bourgeoning field of cognitive semiotics (e.g., Zlatev 2013). Although current semiotic studies of human development make up a rather small niche amongst develop- mental literature, two of the most influential pioneers of developmental psychology, Piaget and Vygotsky, had given a central place to sign-use in their theories. Communication, in particular language, and cognition does not follow separate developmental paths according to both Piaget and Vygotsky. Sign-use regulates both interpersonal and intrapersonal psychological processes. Piaget (1945) has famously dubbed the capacity for using signs in communication and cognition the “semiotic function”. But while for Piaget the capacity to engage in communicative use of signs was one aspect of individual cognitive development, for Vygotsky sign use was developmentally a social, not individual achievement. According to

both the sociocultural school going back to Vygotsky and his colleagues and the social interactionist school in American pragmatism going back to Mead and Dewey, semiotic mediation implies sociocultural mediation and psychogenesis is to be understood within the sociogenesis of mind (e.g., Bruner 1990; Cole 1985; Nelson 1998; Rogoff 2003; and Wertsch 1998).

The present paper approaches the question of social origins through hypothesizing a developmental affinity between metacommunication and second order, reflexive cognitive processes such as metacognition and perspective taking. Bateson (1955) defines metacommunication in terms of a hierarchy of signs, where metacommunicative signs frame first order signs through constraints on interpretation. Metacognition involves higher order monitoring and evaluation of cognitive phenomena. Perspective taking implies constructing or coordinating alternative meanings and interpretations. The postulated developmental affinity is analyzed in terms of their *metasemiosic* aspect; e.g., in terms of second order processes of semiotic mediation reflected in the capacity for attending to signs, their objects and interpretants differentially, examining and controlling sign processes, and judging the success or failure of interpretation. Metase- miosis, in this particular cognitive-semiotic sense, refers to higher order, reflexive processes for recognition, monitoring and evaluation of sign interpretation. By looking at the relatively less studied semiotic proper- ties of interpersonal and intrapersonal reflexive processes, we intend to capture some of their general, common features that can shed light on the developmental connection between interpersonal and intrapersonal meaning-making. This is in line with Peirce’s, Vygotsky’s and Mead’s strategies for approaching the question of mind through the study of sign-mediated action and not vice versa.

The main hypothesis of the paper is that the primary semiotic achievement of human development is the differentiation of meaning into inter-referential layers that are communicatively established, which in turn provides an ecological foundation for metasemiosis in cognition. Differentiation of levels of meaning enables hierarchical organization of signs where utterance and interpretation of first-order signs can be further mediated. Metasemiosis in communication scaffolds the development of metasemiosis in cognition through extending the child’s meaning-making processes over social and material supports; namely, cognitive-semiotic resources of more mature peers and cultural artifacts such as linguistic signs, pictures and diagrams. Communication in this particular function serves as an ecological foundation for cognitive-semiotic development in that it partly constitutes and gradually transforms the burgeoning

metasemiosic capacities of the child.1 The key premises of this perspective can be explicated as follows.

1. It is not sign use per se that which presupposes the capacity for metasemiosis but the reciprocal and reflexive use of signs. Semiosis mani- fests a continuity from mostly fixed, transparent interpretive processes to highly dynamic, socioculturally regulated ones. Human semiosis does not diverge from the broader range of semiotic phenomena in nature in fundamental terms such as featuring as opposed to lacking signs but in gradual terms, through an unmatched degree of metasemiosic mediation that is realized by extending to include other people and cultural artifacts, and internalizing patterns and structures of interpersonal semiosis in the form of higher order cognitive-semiotic processes. Thus, the emergence of human metasemiosic abilities cannot be adequately understood un- less situated within their evolutionary, social and developmental context.
2. The capacity for metasemiosis develops within the context of communicative interactions before it comes to serve self-regulatory pur- poses. Metasemiosic processes involved in higher order cognition have ontogenetically a communicational origin in the use of external signs. Complex communication and cognition involve organizing meaning into inter-referential levels building on a basic understanding of differ- ent aspects of the sign process as such. The developmentally constitutive role attributed to communicative interaction is differentiation of levels of meaning and aspects of semiosis in communication, which allows for hierarchical organization of signs.
3. Differentiation of levels of meaning can best be conceived as an intersubjectively achieved process of semiotic scaffolding: a communi- cative process whereby higher-order semiotic scaffolds in cognition are intersubjectively formed by effectuating a top-down social modification on the psycho-somatic level of scaffolding. Semiotic scaffolds are hierarchi- cally organized, temporary or enduring semiotic supports and controls efficacious on activities of agents in accordance with their evolutionary, developmental, social-relational history or inherited cultural resources (Hoffmeyer 2007, 2015). Genes guide and constrain cellular activity, releas- ing stimuli direct reproductive activity, mathematical formulas facilitate complex calculations, libraries sustain ongoing inquiry and accumulation

1 The term “ecology” refers broadly to the evolutionary, social and cultural contexts wherein cognition is embedded. The ecological approach to cognition is generally traced back to Bateson’s ecology of mind, the cultural-historical activity theory founded by Vygotsky and Gibson’s ecological phenomenology, many of whose ideas have found con- temporary expression in theories of embodied, extended, situated, distributed cognition (see also Hutchins 2010).

of knowledge. The temporal order in which semiotic scaffolds change narrows down from phylogenic history to the temporal order of the lived time to the extent that development is mediated by culture. The increasing plasticity of semiotic scaffolds brings about a novel mode of communica- tion which is both to a certain extent efficacious on phylogenetic semiotic scaffolding (e.g., innate meanings) and is responsible for the emergence of higher order scaffolds within ontogenetic time. We designate this novel mode of communication as *transformative* as opposed to *coordinative*. Transformative communication does not presuppose shared meanings, and characterizes communicative processes in development where higher neoteny, slower development and dependence on social-cultural learn- ing are the case. The phylogenetically prior, basic and more pervasive coordinative mode of communication is geared towards facilitating the coordination of individually stably scaffolded activities. Coordinative communication is not efficacious on sign relations themselves, but de- pends on their stability. It facilitates reliable sharing of experience on the basis of common sign relations, collective action, cognitive and affective resonance among social agents.

Further, we trace the operation of transformative communication in cognitive development in terms of a series of hierarchical changes in the structure of semiosis: As levels of interpersonal coordination go from dyadic to triadic and social, the child achieves a basic understanding of the representation relation (sign-object differentiation), recognizes interpretation as a distinct aspect of the sign process (interpretant differ- entiation), and acquires the ability to coordinate alternative interpretations (interpretant coordination). The capacity for differentiating the sign from the object, as Piaget’s semiotic function implies, is reflected in the child’s developing ability to distinguish images or reflections from things and to voluntarily imitate expressions, gestures or vocalizations. A further development is the differentiation of the interpretant: it is a tangible mark of cognitive development when the child moves from looking at the pointing finger to looking in the direction of pointing, or talks with a toy as if with a friend. Still further, the child comes to understand the inherently perspectival nature of sign interpretation as he or she begins to order, combine, connect or compare alternative representations, which is a requirement for the acquisition of conventional symbols and most notably language.

The first section aims at clarifying the usage of the terms semiosis and metasemiosis with reference to Peirce and contemporary semiotics literature. It situates these notions within a broader argument for semiotic

continuity across timescales (phylogenetic-evolutionary and ontogenetic- developmental) and across species (i–ii), which also constitutes the general framework for associating Bateson’s theory of communication and Vygotsky’s sociocultural theory of cognitive development with Hoffmeyer’s biosemiotic notion of scaffolding. The second presents Bateson’s notion of metacommunication in relation to higher order cognition (ii). The third is devoted to the interpersonal-developmental (Vygotskian) and organismic-evolutionary (Hoffmeyerian) conceptions of scaffolding and their communicational interpretation in terms of the proposed distinc- tion between two modes of communication (iii). Lastly, the fourth section concretizes the whole argument through an analysis of earliest landmark cognitive-semiotic activities such as imitation, cooperative role-taking and symbolic play as cases of communicative interaction and with regards to their role in layering sign processes.

# Semiosis Vis-à-Vis Metasemiosis: An Argument for Semiotic Continuity

In one of those rare instances where Peirce uses the very term “semiosis”, he defines it thus:

an action, or influence, which is, or involves, a cooperation of three subjects, such as a sign, its object, and its interpretant, this tri-relative influence not being in any way resolvable into actions between pairs. (c.1907: CP 5.484)

Peirce’s criterion of irreducible triadicity is in fact satisfied by a bigger set of processes than those involving the mental interpretation of signs. Leaving aside the question of triadicity in the physical nature, one issue that is frequently addressed in Semiotic literature is whether we can talk about semiosis in the living nature. Semioticians of a Peircean persuasion, most notably in the field of biosemiotics, often regard semiosis as a ubiquitous phenomenon, coextensive at least with that of life.2 Phenomenologically oriented approaches in cognitive semiotics on the other hand, typically formulate the necessary criteria for attributing the status of a sign pro- cess in metasemiosic terms. Sonesson formulates one such criterion in stating that something is a sign only when “expression and content are differentiated from the point of view of the subject” (2006: 152). Konderak is even more explicit in designating metasemiosis as a condition for se- miosis. Among the criteria for identifying a “semiotic system” he counts

2 See e.g., Kull et al. (2009). The proposition that semiosis is coextensive with life goes back to Thomas Sebeok.

metaknowledge concerning the usage of signs, awareness of alternative interpretations, recognition of mistakes in interpretation, evaluation of signs in regards to their suitability and similar others (Konderak 2017: 83–84). Although he intends the term semiotic system to cover possible artificial sign-using systems as well, as matters stand only humans seem to qualify as sign-users. Zlatev is much less demanding in his criteria for the existence of signification in non-human “meaning-making creatures” (2012: 2), but he follows Sonesson in taking consciousness of the differ- ence between expression and content or referent to be the minimum requirement (2009). As many other processes of mediation permit the designation “semiotic”, those who prefer to restrict the scope of the term sign employ other terms such as signal in referring to semiotic mediators that are used unreflexively.

Positing strictly metasemiosic criteria for the attribution of sign status, however, is arguably not very illuminative if our purpose is to understand the idiosyncratic features of human semiosis in terms of their genesis in evolutionary as well as developmental time. When we take off, instead, from a notion of difference within continuity, explicating what metase- miosis consists in concerns how sign processes are realized differently when a receptive agent treats signs as being distinct from what they signify and reflects on its own processes of interpretation as such. Deely hints at such a perspective in his famous description of the human being as “the semiotic animal” (2007), who not only engages in semiosis but conceives relations obtaining in the world in semiotic terms. In other words, human meaning-making processes are not only semiosis but also semiotics, as pointed out by Petrilli (2014: xviii).

Metasemiosis from a semiotic continuity perspective, moreover, does not mark a singular point of enlightenment whether in phylogeny or ontogeny: it is rather a matter of higher semiotic freedom and versatility; hence it comes in degrees in the realization of sign utterance and inter- pretation. This implies, before all else, that the connection between the sign, the object and the interpretant can be weakened and more variably established, which reflects in the proliferation of intermediate processes between perception and action. When we talk about metasemiosis, we are actually referring to a range of cognitive-semiotic abilities from the most basic sign-object differentiation to recognition and coordination of alter- native interpretations. Metasemiosis constitutes, hence, one fundamental but multifarious aspect of a holistic development which introduces more and more levels of mediation into processes of meaning-making, the most crucial implication of which is that action can be delayed, postponed or even not at all realized.

 Hoffmeyer and Stjernfelt conceive this sophistica- tion in terms of an increasing “subdivision, articulation and differentiation into a range of autonomous parts and aspects of the originally holophrastic [perception-action] loop”, which is “already committed to proto-prop- ositions [dicisigns] guiding action reliably” (Hoffmeyer and Stjernfelt 2016: 27). We can say that metasemiosic capabilities do not result in the emergence *ex nihilo* of sign-mediated cognition and communication, but the latter develop, in their terms, “in a step by step process leading to the attainment of higher degrees of semiotic freedom, higher degrees of com- binatorial complexity, and higher degrees of selection between articulate semiotic possibilities” (2016: 27). We further add to this formulation that the gradual establishment of metasemiosic levels in cognition in human development is not only parallel to but also depends on the sophistication of metasemiosic mediation in communication.

The most immediate implication of a notion of semiotic continuity is the extensive scope of what we acknowledge as signs. Metasemiosic criteria as exemplified in the beginning apply only to the (proper) interpretation of a small portion of signs, typical examples of which are pictures, ther- mometers, maps, traffic lights, words, conventional gestures and the like. Language, for instance, presupposes explicit or implicit metalinguistic knowledge. What is common to most such signs is that their significance depends on there being a rule of interpretation that is established with conscious intent. In other words, they are conventional signs; a sub-group of Peirce’s legisigns (Short 2007: 211). Not only one must know how to interpret words, traffic lights, maps or thermometers appropriately, in difference to interpreting cues pertaining to vocalizations, movement of cars, territories or changes in temperature, but also the very establishment of their rule of interpretation involves conscious communicative intent, which already features the anticipation of this knowledge. In this respect such signs differ from natural communicational signs such as alarm calls or mating displays, where the rule is established in phylogeny or ontogeny through different processes. In Sonesson’s classification the latter appear in mediational semiosis, which he distinguishes from sign-based semiosis (2006: 203).

Not only conventionally established and transmitted signs, but phy- logenetically and ontogenetically ritualized gestures (see e.g., Liebal and Call 2012; Pika, Liebal, and Tomasello 2003), species- or genus-specific expressions such as mammalian expressions of emotion can, on the other hand, be seen as species of legisigns (cf. Zlatev 2009: 184). Short similarly argues that it is not consciousness and intentionality that are essential to

the utterance or interpretation of legisigns, but a purpose or goal that is shared by the utterer and the interpreter, whether it is present to con- sciousness or not (Short 1982: 298; see also Peirce 1904: EP 2.308). In the case of natural legisigns too, how the sign would be interpreted, and that it will be interpreted are somehow included in the very production of the sign. That is, any utterance of a natural legisign has a (albeit unconscious) communicative purpose. Any case of rule-governed communicational behavior, from species-specific calls to social rituals, where the rule in part or by itself constitutes the possibility for that particular form of behavior presents enough ground for its classification as a legisign in the Peircean framework, since signs belong neither to the mental nor to the linguistic realm exclusively. The production and interpretation of instances of legi- signs is governed at bottom by habits that may be “acquired or inborn” (Peirce 1894: CP 2.297), “natural or conventional” (Peirce 1901: CP 2.307; see also Nöth 2010). We can arrive at a continuous conception of legisigns, thus, by positing metasemiosic processes as a further level of mediation instead of a condition of sign interpretation per se.

It might be objected, on the other hand, that non-conventional signs may indicate but cannot represent or refer, which is a central feature of human symbols. An example suggesting a precursor to symbolic signi- fication could be mating displays, which often feature certain postures, vocalizations, expressions or behaviors that have no other function than to create in the other the impression that the performer is the right mate. The connection between the gesture and the sexual desirability of the potential mate, moreover, can be found on no other ground than that the gesture is interpreted sexually. A courtship gesture does not indicate, although it will be interpreted as if it indicates, that the gesturing mate is of the desirable sort for reproductive purposes. Vervet monkey alarm calls, on the other hand, have often been presented as a case of semantic communication by virtue of having categorical reference to types of predators (Seyfarth, Cheney, and Marler 1980).

Human beings have their share of foundational communicational signs that are neither conventional nor learned. Taking into account the prag- matic richness of simplest expressions and gestures we share with other great apes such as crying, frowning, reaching out one’s palm, clapping or embracing (Kersken et al. 2018) enables one to recognize the goal-directed, regulative processes governing their production and interpretation: e.g., their historically mediated triadicity, which is of necessity ignored on the level of synchronic processes. Semiotic habits established in evolutionary time are not ultimately of a different ontological kind, and, as Hoffmeyer and Stjernfelt maintain, “many semiotic abilities involve the integration of both phylo- and ontogenetic aspects” (2016).

Expressions of emotion are a pertinent case to see how communica- tional signs can be established via different paths and in principle admit of unlimited degrees of metasemiosic mediation. Facial expressions characteristically show a dramatically high degree of variation. Just as we can recognize certain emotional displays such as sadness on the faces of newborns, we can also “read” highly fine-tuned culture or group specific displays of sadness quite reliably, as well as fall victim to deception or mockery. Although, in line with the Darwin’s influential account (Darwin 1872), the term expression has traditionally been associated with a sense of mere reflex or reaction that can acquire semiotic value only in terms of indicating the presence of an emotion, emotion expressions are hardly mere indexes of psychological states in the way symptoms are indexes of illnesses: most should rather be regarded as gestures; e.g., communicational signs, because they are addressed to a determinate interpretant. Even if the expression is completely innate and produced involuntarily, there is a correspondence between utterance and interpretation which, though a feature of the phylogenetic history of the expression, allows one to reli- ably attribute a social purpose to its production. When the expression is learned in ontogeny, its production clearly serves social motives, whether conscious or unconscious.

Moreover, a phylogenetic origin does not prevent expressions from being subject to metasemiosic mediation, hence to top-down influences. Although the most basic human facial expressions of emotion such as joy, anger, sadness, fear or disgust show universality across cultures and even species, which suggests an evolutionary origin as it was proposed by Paul Ekman in the light of his now classical studies (Ekman 1993; Ekman and Friesen 1971), the production of a most ubiquitous, uniform expression can serve quite sophisticated social motives or can even bear no actual connection to the emotion it is supposed to indicate—such as the institutionalized, ritual crying at the Sikh funeral ceremony Antam Sanskar. Facial expressions can be both natural yet conventionalized to the utmost degree in their form and norms of production and interpre- tation as the complex, situated social interactions of humans and most primates demand.

Quite pertinent is the account of Alan Fridlund (2014), who has chal- lenged the index or symptom view of facial expressions by arguing that they are irreducibly social mediators that co-evolve with their recipients (i.e., interpretants) and develop through the internalization of social

norms and conventions. Throughout ontogeny we acquire the capacity to distance expressions from emotions, inhibit their utterance, produce them at will, or even use them as meta-signs to refer to concepts or names of emotions, as we do in a game of charades. For instance, although crying is mostly biologically determined, some metasemiosic differentiation and awareness is involved in the child’s cry who aims to attract attention. Some instrumental uses of signs can be discovered through classical learning (“I cry; I get milk”), but only through a history of communicative interaction these sign-object associations become embedded in negotiations. As the interpretant (of the mother) becomes part of the equation, the utterance of the sign acquires a communicative purpose: persuasion.

To view this development of metasemiosic mediation as an aspect of a purely cognitive leap would be to put the cart before the horse. Facial expressions come under higher-order (conscious as well as unconscious) control to the degree of and in parallel to the influence of social norms on individual behavior. Thus, the development of metasemiosic media- tion in cognition is directly related to the internalization of interaction patterns and social norms. Context and audience sensitivity, for instance, presupposes that communication has a metacommunicative level where first-order messages can be modified, altered or denied. The social context of signs including facial expressions of emotion emerges as a factor in communication to the degree that interactions can be metasemiosically mediated within an intersubjectively shared yet ambivalent space. Not overt actions but states, attitudes or intentions are addressed to the re- sponses of others: a slight frown comes to signal disagreement instead of an impending confrontation and enables the other to negotiate the conflict. Primate expressions also share this feature to some degree (e.g., Zeller 1985, 1996). There is no unambiguously “angry” primate, since the expression can derive from a social dominance motive, an intention to deter the other from doing something, produced as a bluff as well as an indicator of potential aggressive behavior. Moreover, the meaning of particular expressions may influence and be influenced by other signs they are used in conjunction with: an open palm with an “angry” face would convey a different kind of request than the same gesture combined with a “sad” face. Expressions and gestures are commonly used in human com- munication as cues to frame messages conveyed through other signs. It is reasonable to suggest, then, that metasemiosic mediation develops within the intersubjective, communicational space created by the interaction between already existing and emerging habits of social interaction, and characterized by ambivalence, negotiation and change.

The main differences between operations of the so-called natural com- municational signs and that of the conventional ones boil down ultimately to the processes by which the rules of utterance and interpretation can be established and modified (e.g., verbal communication, social learning, phylogenetic/ontogenetic ritualization), and consequently the nature of the proximate processes realizing the sign utterance and interpretation. Metasemiosic criteria such as conscious differentiation between the sign and the object, or the mental representation of an otherwise absent object pertain to the domain of such proximate processes realizing semiosis, but not among the criteria for attribution of sign status or those of semiotic taxonomy, which Peirce insisted on stating in logical rather than psycho- logical terms (e.g., 1907: CP 5.485). Hence, they are in this sense accidental to analysis and classification of signs.

The differences in the proximate processes of semiosis, however, are not accidental at all to a wide range of general semiotic topics from creation of novel meaning and meaning-change to comparison, manipulation and coordination of interpretations as well as to pragmatic and rhetorical topics such as negotiation, persuasion or giving and taking reasons. Although our great ape relatives show great cognitive-semiotic ability in perceiving complex events and responding to them in sophisticated ways, to the extent of using signs for deceit and manipulation, their limitation in metasemi- osic capabilities is evident in their relative inability to monitor and shape their own actions, engage in self-cued and voluntary rehearsal of learned skills, model and experiment on patterns of movement or action-schemes, retrieve learned patterns or schemes voluntarily and independently, and, last but not least, to invent and modify communicational signs with a communicative purpose. Merlin Donald (1991) argues that the origins of the modern human mind lies precisely in the transition from a rather reactive and environment-oriented “episodic” lifestyle characteristic of our closest living relatives to one involving reflexive and voluntary modelling, retrieval and experimentation. This inward-turn, so to speak, must precede the whole manifold of conscious symbolic behavior involving language use, since the latter requires the ability for active construction of com- municative acts and their voluntary retrieval. It is reasonable to assume, as Donald does, that these abilities developed in a mimetic, e.g., gestural context, where bodily modelling through “action-metaphors” came to sustain basic representational communication and thought, which still remains a fundamental semiotic domain. With the advent of mimetic modelling, phylogenetically ritualized expressions and movements also become signs that can be refined in reciprocal, intentional communication.

What is central to this transition is the generation and use of signs to effect change in one’s own behavior and mental processes−as memory cues, models of action or environment, media of representation; i.e., in their capacity as signs. This idea that uttering signs to oneself as if, and in the same way one does to others is fundamental to higher order cognitive-semiotic capacities is also central to Vygotsky’s sociocultural theory (1930), where he describes the most important function of (con- ventional) symbols as “reverse action”; i.e., the property of being at the same time a stimulus and a response. Most gestures and expressions lack this property. However, one can draw a map to mark a spot in a territory and consult the same map later to find the spot, or use the same word to express as well as to interpret a concept. We think that the transition from the other-oriented use of signs to a self-oriented use, from gesture reproduction, skill-rehearsal to self-talk and inner-speech, constitutes the most important step in the establishment of further levels of metasemiosic mediation. In the next section we begin to explicate elements of this central developmental idea by looking at multilevel and multimodal semiosis in communication and cognition.

# Levels of Meaning in Communication and Cognition

When the term metacommunication was first introduced by Ruesch and Bateson (1951), it was described as a novel level of communication that gave rise, in the course of mammalian evolution, to some of the most peculiarly complex as well as paradoxical features of social interaction. Communication serves two inseparable but conceptually distinguishable basic functions: informing and prompting further action. The former has to do with the “codification” aspect of meaning, the latter concerns its valu- ation aspect; i.e., the practical domain of action and interaction. Bateson famously calls these two aspects the content and command of communica- tion. He maintains that these two aspects can be differentiated even in the simplest instances of communication such as that between nerve cells. In the human domain, the command aspect of communication contextual- izes or frames its content as to how it is to be interpreted, hence it is more often called the pragmatic aspect of communication (Watzlawick, Beavin Bavelas, and Jackson 1967). Metacommunication accordingly serves two main functions: it allows the confirmation, contestation or negotiation of how reality is to be parsed and of the attitudes of the communicators towards the parsing as well as towards one another.

Bateson further elaborates on the notion of metacommunication in terms of sign hierarchies in “A Theory of Play and Fantasy” (Bateson 1955).

He argues that human communication uses manifold levels of abstraction simultaneously (1955: 179). The denotative level of communication, the literal content, acquires meaning within the frame provided by higher- order messages concerning semantics and syntax (e.g., “mutton” has two syllables) as well as those concerning the relationship between interactants (e.g., “I consider you a friend”). Metacommunicative messages can remain implicit, or be expressed through non-linguistic or linguistic means. Meta- linguistic knowledge, for instance, remains mostly implicit, and relational attitudes are often conveyed through body language.

 The evolution of language and various complex features of interpersonal understanding depend on the differentiation of levels in communication, which facilitates the emergence and sophistication of metasemiosic processes. Many basic metacommunicative rules are presupposed by linguistic denotation, so they cannot have appeared, in evolutionary terms, after we have begun to convey information through language. Sign-object differentiation, before all else, is already implicit in metalinguistic rules such as “words denote sets of objects of which they are not members” (e.g., the word “table” does not have legs). The evolution of metacommunication, thus, must have started at the pre-verbal level, and should also be looked for among non-human animals (Bateson 1955: 180).

Metacommunication, hence metasemiosis, is not an all-or-none but continuous and gradual phenomenon. Threat, deceit, or pretentious behavior observed among non-human animals exemplify, for Bateson, a primitive sign-object differentiation, where the action resembles an- other action, but is acknowledged to be different from it (1955: 183). The observation that serves as the paradigm for Bateson’s discussion of metacommunication is combat-like play among monkeys, where the ac- tions strongly resemble combat while the whole interaction is clearly not combat, both to the external observer and to the monkeys. The playful nip denotes a bite through its similarity, but it does not denote what a bite stands for: a hostile attitude. The metacommunicative message “This is play”, he concludes, must be somehow communicated by the monkeys. This meta-message is similar in form to the logical paradoxes investigated by Russell’s theory of logical types: “These actions in which we now engage do not denote what would be denoted by those actions which these actions denote” (1955: 180). Denotation in human communication and thought has this potential paradoxicality as an intrinsic feature. Delineation of the sign from the object (in this case, another sign) prevents the paradox, but the boundary can easily be blurred in art, ritual, or play where differentia- tion does not imply delineation.

In Bateson’s analysis, emergence of different levels of abstraction follows differentiation of media of communication or types of message. Analog messages (mostly through iconic and indexical signs) differ from digital ones (mostly through symbols) in their context-dependence, con- tinuity, non-repeatability and concreteness (see Bateson 1955: 279–309; Watzlawick, Beavin Bavelas, and Jackson 1967). Digital communication, on the other hand, is characterized by discrete, repeatable and possibly arbitrary mediators. Analog and digital media being interdependent, there is no purely analogical or digital communication. Moreover, most messages have digital and analog properties. Since iconic and indexical grounds, in Peircean terms, are independent of signification, analog communication lends itself more easily to interpretation. Posture, facial expression, rhythm, pitch or sequential pattern signify in a proportionate and/or one-to-one manner (e.g., elevation of a dog’s tail and his rank in the pack, screaming and pain). A bite, in Bateson’s example, is the analogical medium while the playful nip is relatively digital. The nip represents the bite through its similarity, yet is differentiated from it by virtue of its ritualized dissimilar- ity. The playful nip is not only a weaker bite, but also a fictional bite: “Not only do the playing animals not quite mean what they are saying but, also, they are usually communicating about something which does not exist” (1955: 182). Digitalization, of which ritualization is a form, introduces the possibility of negation into the picture.

The availability of differentiated media of communication provides a space of interpretation where negation, contradiction, incommensurabil- ity, and ambiguity are possible. The analog modality of communication by itself cannot express a negation (Wilden 1972: 163). Hence, the digital modality, comprising a wide range from ritualized gestures to linguistic symbols, introduces something novel in terms of what can be commu- nicated. In Hoffmeyer’s words, it “creates a distance which allows for an absence or, as it were, for a ‘not’” which is what monkeys’ play achieves through a ritualized misperformance (1997: 7). Signaling an absence or negation in the analog modality can only occur through demonstrat- ing a part or aspect of the action without consummating it; e.g., a “bite” that does not damage as it otherwise would, and/or complementing it with another, incompatible action, gesture or expression; e.g., assuming a “threat” pose simultaneously with a “play face”. Without regard to the communicative context these actions would seem to be irrational due to the paradoxical nature of the communication. Such changes of form and discordant combinations cannot convey a meta-message without there being a corresponding understanding and anticipation. The action to

be denied must be combined consistently with particular other signs or ritualized through repeated interactions. This way the communicators can come to share a repeatable frame, normally characteristic of digital communication, and thus rise above certain logical constraints of the analog modality. As Watzlawick and colleagues maintain, “ritual may be the intermediary process between analogic and digital communication, simulating the message material but in a repetitive and stylized manner that hangs between analogue and symbol” (1967: 103).

Higher order cognitive processes have a hierarchical structure similar to that of multilevel communication and feature a range of metasemiosic abilities. A pertinent example is metacognition, broadly defined as “cog- nition about cognitive phenomena” (Flavell 1979: 906). Metacognition generally has two aspects. Metacognitive knowledge is one’s knowledge or beliefs about oneself and others, about what and how one knows, believes, feels, can do better or worse, and about actions, means and strategies. Metacognitive regulation or control is one’s awareness, evaluation and management of one’s thought processes, actions, aims and plans (Baird and White 1996; Flavell 1979; Kuhn and Dean 2004; Schraw, Crippen, and Hartley 2006). Konderak construes metacognitive knowledge and skills, such as the ability to access and report own mental states, to provide reasons for own actions and correct own mistakes in interpretation, as metasemiosic activities (Konderak 2017). In general terms, metacognition involves recognizing, isolating, reconfiguring or coordinating different elements of first order sign processes in order to make them available for evaluation, monitoring or regulation.

Perspective taking is another example of higher order cognitive processes that call for metasemiosic abilities. In terms of visual percep- tion (see Piaget and Inhelder 1948; Sonesson 2007), perspective taking involves the ability to recognize the contents of one’s perception of an object as an index of the whole object (sign-object differentiation), to construe another person’s perceptual interpretation as an alternative to one’s own (sign-interpretant differentiation), and to coordinate these two interpretations as compatible perspectives on the same object (coordina- tion of multiple interpretants). Understanding of other’s false-beliefs or of alternative naming, for instance in homonyms and synonyms, on the other hand, require conceptual perspective taking. Perner et al. (2002) connect false-belief tasks and alternative naming tasks frequently used in developmental studies in terms of the underlying meta-representational, or conceptual perspective taking capacities addressed by both. They argue that children’s mastery in false-belief tasks reflects their representational

understanding of mind, while mastery in alternative naming tasks reflects their representational understanding of linguistic expressions, or meta- linguistic awareness (see also Doherty 2000; Garnham et al. 2000). Both tasks ask for a coordination of different representations understood in their perspectival nature: the former task requires the coordination of an accurate representation of a given situation with an alternative, truth- incompatible perspective and the latter the coordination of multiple truth-compatible perspectives. Metalinguistic awareness addressed in alternative naming tasks, in line with Bateson’s hierarchical picture, enables the child to coordinate several signs, such as the sortals Dalmatian, dog and animal (E. Clark 1997), as individuating the same thing from alterna- tive perspectives or, in Peircean terms, as being determined by the same dynamic object but giving rise to alternative interpretants due to having different immediate objects.

How do these levels and aspects of meaning emerge in communication and cognition throughout ontogeny? In the next two sections we turn to the notion of scaffolding and see how the development of higher order individual processes are embedded in an interpersonal, communicational process of semiotic scaffolding.

# Hoffmeyerian Semiotic Scaffolding and Transformative Communication

The scaffolding metaphor was originally used in developmental and edu- cational contexts, in describing temporary frameworks of assistance that support children’s performance in a given task until she is able succeed on his or her own. Instructional scaffolding bridges the gap between the child’s potential capacity and her actual, unassisted performance level, which Vygotsky famously designated as “the zone of proximal development” (1934b). The sociocultural research program inaugurated by Vygotsky and his colleagues also hinted at various other aspects of scaffolding in terms or internalization and externalization processes. While instructional scaffolding mainly denotes intersubjective communicative processes which are external and temporal supports, the notions of internalization and externalization germinally foreshadow future extensions of the metaphor to cover the material aspect of supporting structures in the contemporary notions of extended mind and human niche construction (Clark and Chalmers 1998; Odling-Smee, Laland, and Feldman 2003) as well as the sense of permanent structures in Hoffmeyer’s biosemiotic notion.

The gist of the Vygotskian perspective on cognitive development is that higher cognitive functions originate in social interactions with more

mature peers and develop through the internalization of intersubjectively achieved processes as mental operations (Vygotsky 1930: 56). Any higher function, according to Vygotsky, “appears twice, on two levels. First, on the social, and later on the psychological level; first, between people as an interpsychological category, and then inside the child, as an intrapsycho- logical category” (1930: 128). The distinguishing mark of the Vygotskian genetic perspective is the emphasis on the inherently dialogical character of the process of forming second order representations, which is more easily apparent in early phases of development and becomes increas- ingly unascertainable as activities move from the interpersonal to the intrapersonal domain; e.g., from audible private speech or self-talk to the “inner speech” of mental planning, self-evaluation or inferential thought (Vygotsky 1934b: 68).

Although Vygotsky focused more on the emergence of higher cognitive processes through internalization, ensuing research in the sociocultural tradition more explicitly emphasized how mental processes are offloaded into the environment in the form of cultural artifacts (e.g., Bruner 1990; Wertsch 1998). Considering cognitive development from the viewpoint of both internalization and externalization processes, the transition from interpsychological to the intrapsychological in development appears to be marked by the acquisition of the capacity to use cultural artifacts as semiotic mediators (Wertsch and Stone 1985). Cultural artifacts scaffold individual, intersubjective and collective activity by providing cognitive extensions, and collectively a cognitive niche (A. Clark 2006; Cole and Wertsch 1996; Flynn et al. 2013). Throughout development the activities of the child are scaffolded by peers who are more adept in using semiotic mediators so as to form an extended semiotic system, until the child is capable of scaffolding his/her own activity using the semiotic resources of the cultural Umwelt. Internalization, as the global developmental process, is realized through the child’s mastery in externalizing thought processes through the use of semiotic mediators. It culminates in the transformation of the cognitive processes from being other regulated (externally scaffolded) to self-regulating (self-scaffolding) through the reflexive use of semiotic mediators (Wertsch 1979; Holton and Clarke 2006; Valsiner 2005).3

3 Mark Bickhard argues that in the “classical” view of scaffolding self-scaffolding be- comes a self-contradictory notion, since it would require that the system provides to itself some skill or knowledge that it does not have (Bickhard 1992). The large body of research on self-talk within the classical view of scaffolding, on the other hand, focuses on a central and ubiquitous phenomenon where children regulate their own actions and thought pro- cesses through speech (e.g., Berk 1994; Nelson, ed. 1989; Winsler et al. 2009). Planning, for instance, follows a developmental trajectory from absence to mastery through self-talk.

The soft belly of the sociocultural perspective is its neglect of time- scales bigger than those of cultural and ontogenetic transformations. Hoffmeyer’s biosemiotic notion that comprises structures that become part of the system allows addressing precisely these dimensions. Semiotic scaffolding is a generalization of the instructional notion to refer to all kinds of communicative processes working in coordination at various levels of organization throughout nature (Hoffmeyer 2007). In view of Hoffmeyer’s generalized conception, instructional scaffolding is a special case of a broader phenomenon coextensive with life, which he famously characterizes as “the key to nature’s tendency to take habits” (2007: 156). Kull draws attention to the relation between semiosis and semiotic scaf- folding by designating the former as an “active meaning-seeking-making process” that presupposes semiotic freedom and the latter as the resulting establishment of structures that “canalize further behavior” by reducing degrees of freedom (Kull 2015: 228). Semiotic scaffolding implies then a history of “semiosis with a trace,” one prominent form of which is learn- ing (Kull 2018: 138). Semiotic freedom implies that the formation of the interpretant is an underdetermined process. All semiosis is scaffolded by manifold semiotic constraints, which may be inherent to the system or placed from outside. On the other hand, not all semiosis results in the establishment, consolidation, modification or transformation of a struc- ture, habit or rule. When it does, semiosis is not only a meaning-making but also a scaffolding process. Semiosis, then, can simultaneously be scaf- folded and scaffolding; e.g., grounded in a history of semiosis as well as determining future acts to conform to a specific form.

Various descriptions of semiotic scaffolding converge on their em- phasis on diminishing semiotic freedom or increasing directionality (e.g., Emmeche 2015; Favareau 2015). Semiotic scaffolds are (networks of) sign relations which are enabling and constraining at the same time. They support realization of actions that otherwise defy the capacities of the organism, allow for the establishment of further sign relations of higher complexity, extend the space of action possibilities, enable generalization and so on. By the same token semiotic scaffolds close up certain possibili- ties in the course of phylogeny and ontogeny irreversibly, or introduce biases in species, environment and culture-specific ways.

Semiosis as an actual process happening *hic et nunc* always requires regulative constraints or processes operative at the macro-semiotic level, which set boundary conditions upon which of the potential sign relations may be actualized (Queiroz and El-Hani 2006). Phylogenetically established semiotic scaffolds, cultural cognitive niches, interpersonal scaffolding as

well as metasemiosic knowledge or skills are forms the regulative con- straints and processes on the macro level might take.

From this hierarchical perspective on semiotic mediation, we can distinguish between processes that are primarily scaffolded or scaffolding. Scaffolded semiosis relies on rules for sign production and interpretation, in the broader sense involving dispositions as well as conventions, that are already established in a higher timescale, for instance the literal utterance and interpretation of words or use of diagrams. In phylogenetic scaffold- ing such rules are established in still higher timescales and not through semiotic processes, as in the case of newborns who prefer high-pitched female voices to any other independently of any learning. Scaffolding se- miosis, on the other hand, denotes sign processes which are responsible for the establishment, or effective in the modification, of particular habits or conventions of sign production and interpretation, from discovery, critical reflection to teaching and all other intersubjective processes of meaning creation and negotiation. Why should we make such a distinction? While it can tap onto the semiotic aspect of the difference between habituated action patterns and processes of learning, it is most illuminative for our purposes in relation to communication.

Communication is an umbrella term for a very diverse range of pro- cesses from information exchange in artificial systems to political debates. We think that one very crucial aspect of human communication is its crucial and irreplaceable developmental function. Semiotic scaffolds are established in many species only in phylogenetic time, in some also in onto- genetic time, in still fewer species, most notably primates, they can also be established or modified to some extent within social interactions through imitation, ritualization or teaching. This diversity in the plasticity of semi- otic scaffolds is correlated with degrees of semiotic freedom and the extent to which development relies on environmental and experiential factors. Humans diverge from close primate relatives in their higher neoteny; that is, developmental immaturity and prolonged period of childhood (Gould 1977; Montagu 1989), and this relative retardation of development has significant consequences for cognitive and behavioral plasticity (Bjorklund 1997). Communication enters the picture as a constitutive factor, because human development is carried over to and partly accomplished by culture. The constitutive communicative processes in question are characteristically instances of scaffolding rather than scaffolded semiosis.

Coordinative and transformative communication differ in being primarily scaffolded or scaffolding processes of social interaction. Co- ordinative communication relies on unambiguously shared meaning.

Species-specific calls are a pertinent example. Human communication too frequently uses the coordinative mode. Organization of collective activity, for instance, often requires efficient transfer of information, clear com- mands and compliance with fixed social roles and regulative rules such as etiquette. Close interpersonal relationships or interactions between infants and caregivers, on the other hand, depend on ongoing meaning creation and negotiation. Particularly in development, communication also needs to create its own scaffolds.

# A Hierarchical Model of Cognitive-Semiotic Transformations in Development

The operation of transformative communication in development is realized in the form of a hierarchical series of transformations in the structure of semiosis through the shifting focus of intersubjective scaffolding. These transformations bring about novel levels of abstraction, first within the so- cial interaction, then in the organization of the child’s cognitive processes. Trevarthen famously marks three major landmarks of socio-cognitive development as primary, secondary and tertiary intersubjectivity (1998). In mapping cognitive-semiotic development onto levels of intersubjec- tivity, Trevarthen captures Vygotsky’s crucial insight that “the levels of generalization in a child correspond strictly to the levels in the develop- ment of social interaction” (Vygotsky 1934a: 432, as trans. in Cole 1985: 148). The emergence of novel levels of abstraction in social interaction and cognitive development accords with a genetic interpretation of the Peircean icon-index-symbol trichotomy. It is hypothesized that earliest communicative interactions diachronically move from dyadic to triadic and social levels of interpersonal coordination and give rise to iconic, in- dexical and symbolic dimensions of communication. These three emerging dimensions are accordingly approached in terms of paradigmatic activities that characterize Trevarthen’s three levels of intersubjectivity: i) mimetic imitation, ii) coordinated interactivity, and iii) symbolic play (See Table 1.

**Table 1:** Correlation between paradigmatic activities, levels of interpersonal coordination and emerging dimensions of communication

**Paradigmatic Activity Interpersonal**

**Coordination**

**Emerging Dimensions of Communication**

Mimetic imitation Dyadic (sensimotor, affective) Iconic Coordinated interactivity Triadic (shared reference) Indexical Symbolic play Social (shared meaning) Symbolic

Differentiation of levels and aspects in communication is correlated, as we have argued, with the development of three fundamental metase- miosic abilities: understanding the representation relation (sign-object differentiation), recognizing the possibility of difference in interpretation (interpretant differentiation) and coordination of alternative interpretive perspectives (interpretant coordination) (See Table 2).

**Table 2:** Correlation between age groups, communicational achievements and metasemiosic abilities

**Age (approx.) Communicational Achievement Metasemiosic**

0–9 months Replication of form Sign-object differentiation

**Ability**

9–18 months Differentiation of denotative and relational levels

From 18 months on Object/action incongruent

metacommunicative frames

Interpretant differentiation

Interpretant coordination

# Mimetic Imitation

An important body of research in pre-linguistic parent-infant commu- nication, or early infant semiosis by Vygotsky (1934b, 1930), Trevarthen (1979, 1994, 1998), Bråten (1992) and others present the semiotic richness of these earliest interactions, which were considered previously as not manifesting any communicational effort or capability on the part of the infant. The infant’s earliest meaning-making activity, however, is funda- mentally dialogical, and the development of the child’s semiotic means is a social process from the start.

At this earliest phase communication has almost a purely metacom- municative character in the sense that the content or topic is the very forms and patterns of communicative episodes, including the relationship between the communicators. This might sound strange considering that the denotative level of communication is yet completely absent, since ref- erencing requires the coordination of at least three elements: an utterance which addresses an interpreter’s understanding about an object. Achieving this minimal triangulation requires a basic sign-object differentiation. These earliest communicative interactions, however, are the cradle of this foundational metasemiosic ability. The enormous communicative potential of the human infant and the correlated intensive semiotic effort involved in human caregiving practices bring about a peculiar interactive situation where metacommunicative functions of signs begin to be explored even

before the onset of referential communication. In line with Bateson’s dis- tinction between report and command aspects of a message, Trevarthen distinguishes between referential and relational aspects of signs (1994). In neonatal imitation the reference of a gesture is none other than to its form, and it starts gradually to extend to objects and other persons as the infant begins to link the other’s gaze and expressions to his or her own in attending to an object or person. Neonatal imitation has, thus, some interesting similarities to metalinguistic elements of metacommunica- tion. Since until roughly 12 months (see also Carpenter et al. 1998) there is no differentiated content, neonatal imitation cannot be counted as metasemiosic. But pure attention to form and its reproduction prior to the apprehension of meaning implies a predisposition towards differentiating the form of the behavior and the purpose (the sign and its meaning) as two distinct aspects. After 12 months, when the child can both reproduce the form and apprehend the meaning of the behavior, the form can be negotiated, hence marking the emergence of metacommunication in the sense of framing lower level messages.

The relational aspect of communication expressed through intonations and bodily expressions of emotion, on the other hand, has an even more pressing importance in the earliest interactions. These make up collectively the bourgeoning pragmatics of pre-symbolic communication. Following Halliday’s (1993) interpersonal conception of the grammar of mood, besides the ideational or prepositional one, Thibault (2000) argues that the grammar of mood is the fundamental linguistic resource for bringing about modalized transformations of information about the shared world and the interpersonal orientations of the communicators to this informa- tion and to each other. Since at this stage shared attention and collective manipulation of objects is lacking, there is no denotative level of commu- nication but the relational metacommunicative level where interpersonal orientations, the relationships are negotiated and transformed is already there. As Halliday maintains, meanings are construed first interpersonally as activity before they become ideational. Thus a prelinguistic interpersonal grammar of mood, in particular those moods such as the interrogative which have a crucial role in relational terms seems to be the first level of the multilevel and multimodal complexity of adult communication. Trevarthen too contends the interrogative mood or “voice,” as he refers, to be the primary relational aspect and argues that it characterizes the I- you mode of relationship which is later complemented with the I-it mode as the child becomes able to refer to objects thorough signs. According to Trevarthen, within primary intersubjectivity such relational “voices” and an emotional syntax of communication gradually emerge as from

3 months on the infant moves towards negotiation of expressions with increasing initiative (1994).

Communication in this earliest form is characterized by iconicity. The meanings of gestures are not typological as those of symbols, but topological-continuous in character. For Thibault (2000), intonation is a prime example for iconicity, which presents the affective states of the per- son in their embodied immediacy. Intonation is analogical and manifests the necessary relationship between the iconic sign and the affective state it is interpreted as representing. In the earliest proto-conversations of the parent-infant dyad such iconic signs are not part of or accompany indices or symbols, at least on the part of the infant, and as such do not have any lower level message to “frame” as in mature communication, but fulfill the pragmatic role of signs on their own in being about the relationship between the communicators, largely thanks to the interpretive input of the parent quite dissimilar in amount compared to common communicational practice (Bruner 1975). By imitating the parent’s iconic (analogue) signs as such, the infant is also apprenticed into the iconic means of linguistic communication, such as the communicational use of varying melodies, rhythms, paces of a language.

The relation between the iconic sign and its object, such as that be- tween the intonation or the facial expression and the affective state, is at this stage necessary and immediate and for this reason the sign cannot be differentiated form its object. The role of the parent is to introduce a distance between the two, and there are plenty of examples of how this gradually happens in proto-conversations. An extremely important case of transformative communication is what developmental psychologists call “affect attunement” (Stern 1985) or “affect marking” (Fonagy et al. 2002). In difference to emotion contagion observed in many mammal studies, the parent attunes to the affective states of the infant in responding to his or her emotional expressions with a sufficiently similar but markedly dif- ferent expression. This way the infant perceives that his or her emotion is being recognized, that is in semiotic terms the parent’s expression is similar enough to be iconic of the infant’s expression, but also different enough for the infant to understand that the emotion is his or her own and not the parent’s. Basically the parent is saying on the implicit metacommu- nicative level: “I feel you but I am not you”. The role of affect marking or attunement is enormous from the perspective of affective development, but also from a broader perspective of semiotic development. From the attachment perspective, affective coordination provides a dependable

and repeatable environment for the infant, where emotional expressions can become salient and gradually acquire a habitual form. The distance introduced between the sign and the object is crucial for the infant to at- tain mental state awareness (Legerstee, Markova, and Fisher 2007) as well as to gradually achieve the capacity for indexical interpretation and use of signs. In order for the infant to be able to associate the occurrence of a familiar gesture with the occurrence of a familiar event, the parent-infant dyad first needs to develop habitual forms of display (iconic legisigns), as Trevarthen puts it (1994). Then, these can be interpreted as indicating intentions, requests, or as directing attention to third parties. Signs such as exclamations or the pointing gesture require such habituated forms in order to function as communicational indexes. Dramatization, exaggera- tion, ritualization of interaction patterns, performance of imitated tricks, jokes and similar activities that characterize the emergent metacommu- nicative level contribute to sign-object differentiation in the same way (Trevarthen 1994, 1990).

# Coordinative Interactivity

Beginning around 9 months of age, profound changes in the structure of social interaction take place, accompanied by the use of indexical signs in communication. Towards the second year the infant has an improved interest in inanimate objects and can coordinate his or her behavior with that of others and can have a basic understanding of intentions. Shared attention is the landmark semiotic achievement marking this transforma- tion, which enables the parent-infant dyad to share a space of interest and point of view (Butterworth and Grover 1988). Tomasello and Carpenter (2007) explicate the developmental of shared or joint attention as a trans- formation that goes from gaze following to the use of indexical gestures such as pointing. West (2014) traces this development, on the other hand, to earlier points in time. She conceives shared attention in terms of a uni- tary development of indexicality in cognition and communication, which begins with visual tracking or the reproduction of another person’s gaze trajectory (proto-index) around 3 months, becomes a full-fledged index with gaze following by 4 months, gives rise to pre-deictic gestures such as visually-directed pointing by 8 months and in subsequent years, through the development of reciprocity and perspective taking in interactions, to deictic gestures with semantic meaning.

The way in which the infant perceives and manipulates objects accord- ingly undergoes a significant transformation in that they can now not only explore their affordances on the sensory-motor level, but also in reference

to social interaction. Objects begin to acquire a social meaning, they can be made interesting or relevant by and for other persons. Vygotsky has famously described the emerging semiotic capacity for using signs (e.g., gaze, pointing) in modifying another person’s orientation and behavior towards a common object and later to do the same on oneself to scaffold one’s activity as the capacity for instrumental meaning. The instrumental use of signs, typically of the pointing gesture, comes before their ideational or conceptual use and is a necessary step towards it. Proto-conversational variants of the imperative mood (Thibault 2000) in infant vocalizations are a good example of emerging instrumental meaning. Imperative pointing precedes declarative pointing and its precursors such as “holdout” and “give” gestures which appear typically later, towards the end of the first year (Cameron-Faulkner et al. 2015). By 12 months of age, infants begin to point in order to share not only attention but also interest: they can now direct the other’s attention to an object of reference and express surprise, joy, astonishment or fright.

As the way the child begins to exploit the communicative affordances of coordinating vocalizations with gestures, a basic two-channel system that can convey different aspects of meaning comes about (Trevarthen 1990: 728). The child can now comply with, comment on, or negotiate the instructions of the caregiver, and becomes responsive not only to invitations or encouragements, but also to imperatives and directives (Trevarthen and Marwick 1986).

The infant can gradually grow out of person-person games (Trevarthen 1990) and engage in person-person-object games like throw and catch, where the persons have different and complementary roles. Such activities constitute a basis for triadic action schemes such as giving/taking, hiding/ finding, telling/listening, requesting/complying and so on. These are the earliest experiments of taking and coordinating different perspectives (Martin, Sokol, and Elfers 2008; see also Mead 1934), and triadic inter- activity can be said to furnish a pre-symbolic ground for social cognition (Fuchs 2013). The later symbolic achievement of understanding speech roles and of the manifold of transitive verbs which take a direct and indi- rect object have an experiential and enactive basis in triadic interactivity.

The development of representational use of signs towards the end of the first year is marked typically by the beginning of pretense behavior. Object affordances already made salient with the development of the ca- pacity for instrumental meaning facilitates unrealistic use of real objects in self-pretend (e.g., pretending to drink from a cup) and, around 12–13

months, role and object substitution (feeding a doll, playing banana- phone) (McCune-Nicolich 1981; McCune 2008; McCune and Zlatev 2015).

# Symbolic Play

Piaget conceived the major accomplishment of this period to be the tran- sition from sensimotor to representational cognition. The development of play has often been used as a model of describing the trajectory of this transition. According to McCune the defining attribute of symbolic play is the transformation of activities from their real objectives and objects to their real counterparts (McCune-Nicolich 1981; Zlatev and McCune 2014). She identifies five levels of play in tracing children’s cognitive development. We will dwell in particular on the fifth level, internally directed symbolic games, since a markedly bigger leap in cognitive achievement is required by the transition from the fourth level to the fifth.

The major characteristic of these games is their hierarchical structure. While in the previous level we have games where several action schemes are combined in linear sequences, here the games require the hierarchi- cal combination of at least two different representational structures and a mental transformation directs the related pretend behavior. For instance, when an object is substituted for something else, an internal definition subordinates the affordances of the physical object to itself in directing the pretend behavior. Planning prior to the execution of a pretend behavior also manifests this hierarchical structure. Finally, play scenarios where an object is treated as if it is an independent agent also imply such a hierarchy brought about by a mental transformation.

The structure of internally directed symbolic games is highly similar to Bateson’s analysis of play in terms of incongruent metacommunicative frames. When we acknowledge that symbolic games take place in a social context and usually are initiated by a more mature peer, at least initially, we recognize the underlying communicational dynamics better. Symbolic play is possible only when communication is hierarchically organized to have a metacommunicative level which indicates that the actions performed do not denote what they would normally denote. The message “this is play” is crucial in order to make sense of treating a banana like a telephone or behaving like mothers or doctors.

The earliest versions of symbolic games are to some extent anchored in physical affordances. The child can treat a stick like a horse but not a pillow. The iconic and indexical aspects of signs clearly both constrain and support, hence scaffold their emerging symbolic use. The most cru- cial feature of such proto-symbols is not, however, that they are not yet completely freed from iconicity and indexicality, but that they are

the products of the child’s experimentations in articulating and manipulating interpretants. The seat of such manipulation is not primarily the head, but social interaction; e.g., the production and interpretation of object and action incongruent messages. Once the child sufficiently internalizes the process of communicating two incongruent messages at two levels, she can then treat objects purely as signs, relying primarily on symbolic operations like when one marks cities with crosses while drawing a map. Vygotsky’s emphasis on internalization and externalization gives us a more genetically oriented perspective on the transition from sensimotor to representational cognition, which allows one to conceive the psychological structure of conventional symbols as inherently dialogical. The child moves from acting under the dominance of her immediate sensory-motor context and own impulses to acting in a planned, thoughtful and self-controlled way through using culturally mediated interactional processes (most prominently speech) to give structure to action (Vygotsky 1930: 27–29). Regulatory self-talk is a prominent example.

As Trevarthen contends, treating symbolic operations merely as ma- nipulation of internal representations misses the motivational, emotional, social and pragmatic basis of symbol use (1990). The most foundational function of the symbol is anchored in communication; that is, in the social need for taking and coordinating social perspectives, giving and taking reasons for actions, negotiating attitudes and relationships, opening one’s perception, emotion and thought processes to the guidance, evaluation, understanding, confirmation or critique of the others. The culturally estab- lished symbol, in being essentially metasemiosic, basically allows for the top-down modification of iconic and indexical scaffolds, whether they are learned or inborn associations, relational attitudes, interaction patterns or behavioral dispositions. Symbolic signification is realized ontogenetically first in communication, and secondly in thought. As Trevarthen puts, in very Vygotskian terms:

We think and remember symbolically because we communicate symbolically. Intrasubjective processes of reflective thought grow out of intersubjective exchange, in which motives for consciousness and action in different individuals are linked up and mutually adjusted. (Trevarthen 1990: 738)

# Conclusion

We have argued that higher order cognitive processes such as metacognition and perspective taking require hierarchical organization

of sign relations, which in turn require differentiation of meaning into inter- referential levels of abstraction. This differentiation is realized primarily within the context of communicative social interaction and subsequently through metasemiosic abilities. We proposed interpersonal semiotic scaf- folding, termed transformative communication, as the ontogenetic process responsible for the differentiation of levels of meaning, and argued for its constitutive role in the development of fundamental metasemiosic abili- ties such as sign-object-interpretant differentiation and coordination of alternative interpretations. Transformative communication is the social process whereby higher order rules, habits or conventions regulating and constraining sign processes are formed within ontogenetic time. The peculiarity of communicatively formed higher order semiotic scaffolds is that they can bring about sign relations, typically conventional symbols, that are essentially dialogical and potentially reflexive. Thus, we concluded, higher order, regulative and reflexive cognitive-semiotic processes have a communicational origin in the interpersonal scaffolding of cognition and action.

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