5. Bodily mimesis in ontogenetic development

Lectures in Cognitive Semiotics

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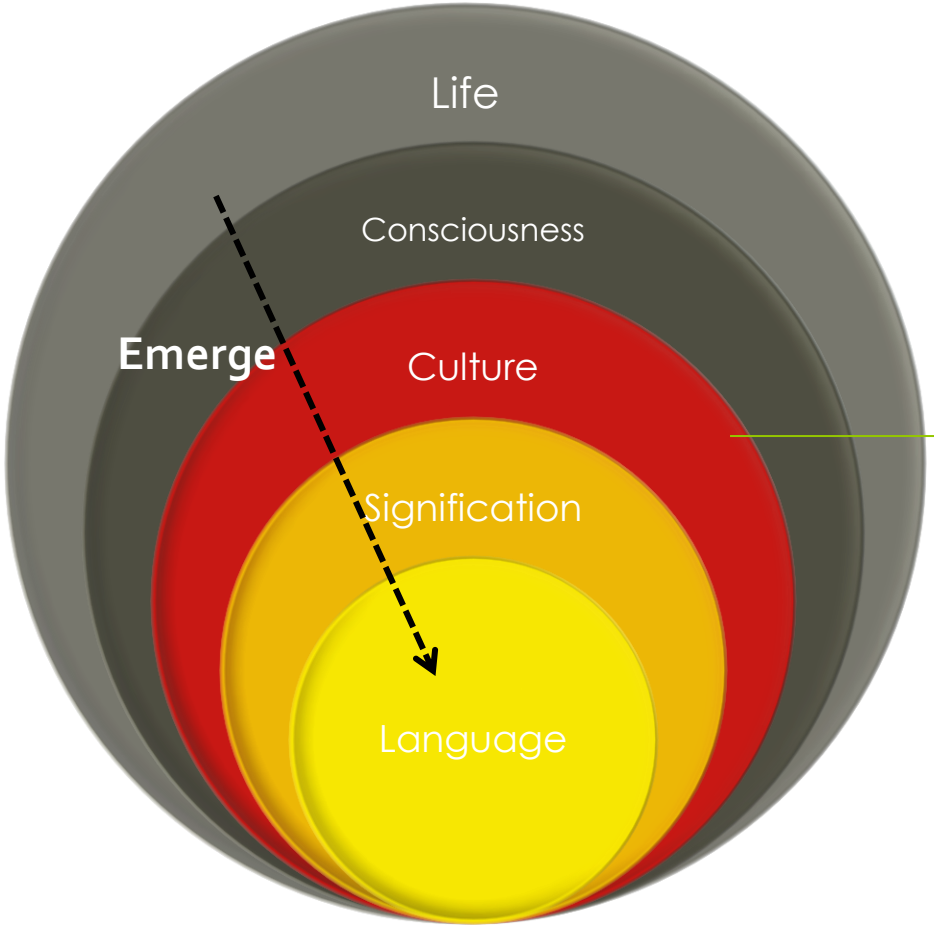
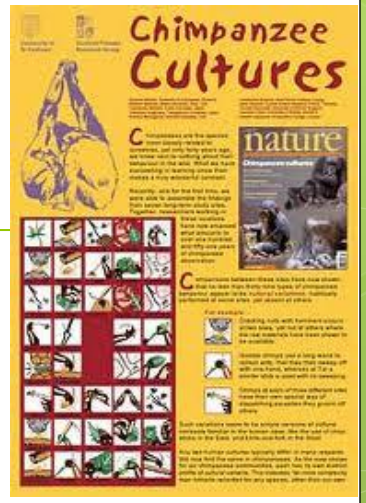
The Ladder of Meaning





Adaptations for protolanguage (Arbib 2012)

"biological evolution yielded first a brain that gave our ancestors an ability for complex action recognition and imitation, and later yielded a brain that could use this skill for communication as well as practical action – a brain **adapted for "protolanguage"** rather than language in all its syntactic and semantic richness" (:161)

"… the demands of an increasingly spoken proto-vocabulary might have provided **the evolutionary pressure that yielded a vocal apparatus and corresponding neural control to support the human ability for rapid production and co-articulation of phonemes** that underpins speech as we know it today" (179)

From evolution to development

- "All important changes in evolution are alternations in development." (Thompson 2007: 195)
- "What EvoDevo … stresses is that genes do not genes do not create the adult phenotype directly but help channel the development of the organism…" (Arbib 2012: 152)
- Analogies in emergence sequences in evo and devo: **evolutionarily older** capacities **emerge earlier** (Donald 2001; Zlatev 2003)

Overview

1. Issues in semiotic development
2. Bodily mimesis and the Mimesis Hierarchy model in semiotic development
3. Five stages in the development of intersubjectivity in children
4. Conclusions

Zlatev, J. (2013). The mimesis hierarchy of semiotic development: Five stages of intersubjectivity in children. *Public Journal of Semiotics,4(2): 47-70.*

1. Issues in semiotic development

Semiotic development

- Children develop from birth (and even earlier) not just ***cognitively***, i.e. what they *know* about their surrounding physical and social environment, but in terms of ***meaning***: as their value-based relationship to the world as subjects of experience (Zlatev 2009, Lecture 2).

- With time, this relationship changes, acquires new dimensions and undergoes transitions. In other words: children undergo ***semiotic development***.

Models of semiotic development

First year

- Primary and secondary intersubjectivity (Trevarthen 1979; Trevarthen & Hubley 1978)
- Awareness of self and other (Reddy 2003, 2010)
- Triadic interactions with cultural artifacts (Moro 2011)

Later…

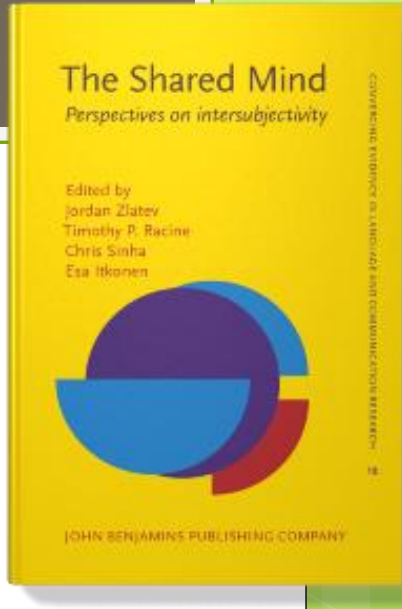
- Joint attention, pointing, symbols, communicative intent, words and constructions (Tomasello 1999, 2003)
- Narrative, autobiographical memory (Nelson 1999, 2003)
- Understanding of iconic signs (DeLoache 2004, Lenninger 2012)

A more general model?

- If we compare any of the mentioned studies with **Piaget's classical theory (Piaget 1954, 1962),** they appear quite specific, with focus on particular ages and cognitive-semiotic skills such as interpersonal interactions, artifacts, intentions, words, narratives, pictures...
- An exception: McCune (2008): ***How Children Learn to Learn Language***

Emergence of gestures

- A crucial social-semiotic skill, requiring a semiotic ("multi-modal") approach.
- Co-develop with speech (e.g. Bates et al. 1979; Iverson & Goldin-Meadow 1998; McNeill 2005; Voltera et al. 2005; Andrén 2010).
- Part of a more general cognitive-semiotic suite (bodily *mimesis*): "In its purest form, it is epitomized by four uniquely human abilities: mime, imitation, skill, and gesture." (Donald 2001: 263)



Intersubjectivity

- Bodily mimesis is also intimately linked with the human capacity for *intersubjectivity* (Zlatev, Racine, Sinha & Itkonen 2008)

- "… the sharing of affective, perceptual and reflective experiences between two or more subjects, [which] can take different forms, some more immediate, while others more mediated by higher cognitive [-semiotic] processes" (Zlatev 2008a: 215).

2. The Mimesis Hierarchy model in semiotic development

Bodily mimesis (Zlatev 2005, 2007, 2008a, 2008b)

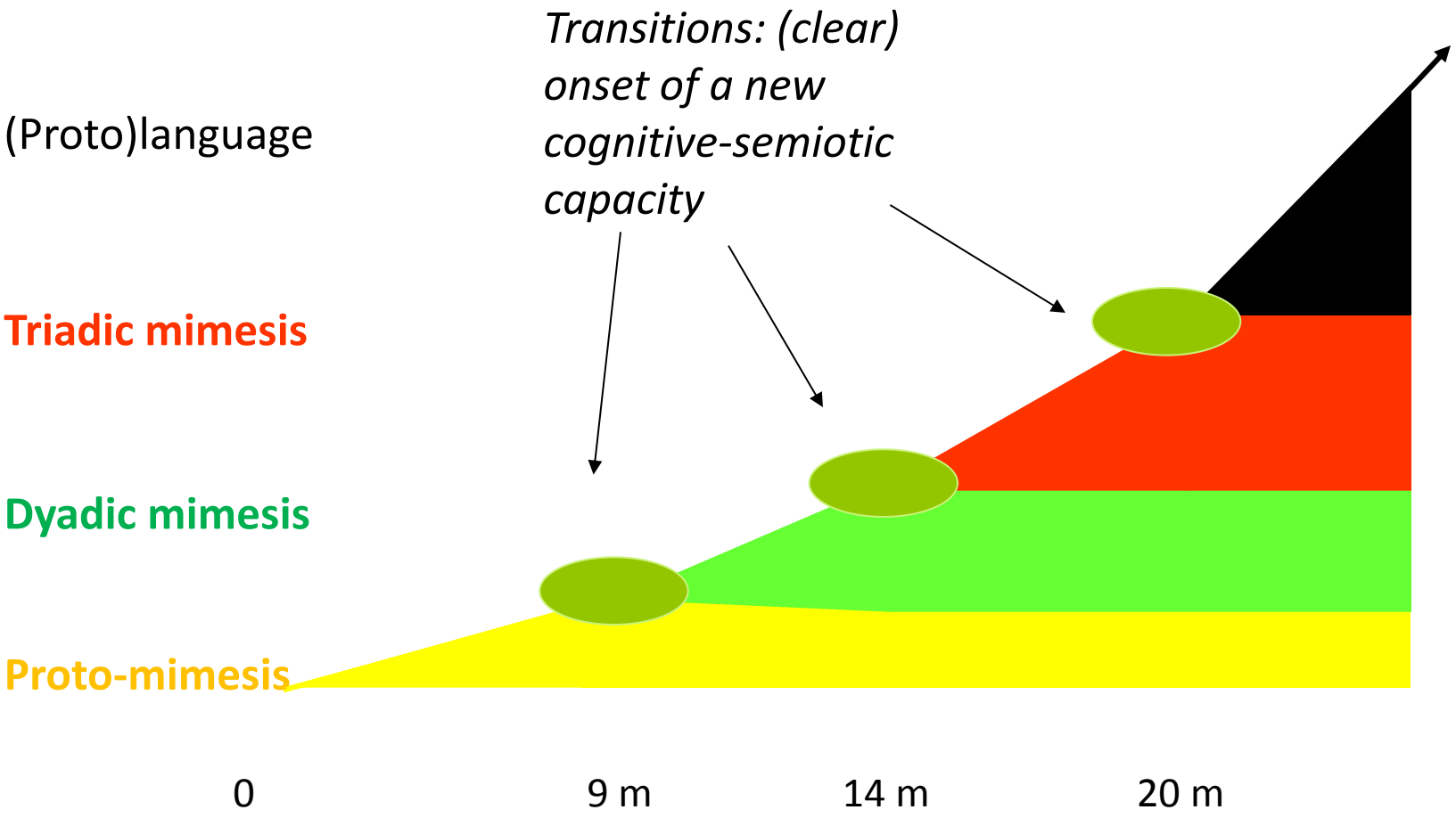
An act of cognition or communication is an act of bodily mimesis if and only if:

1. It involves a ***cross-modal mapping*** between exteroception (e.g. vision) and proprioception (e.g. kinesthesia).
2. It is ***under conscious control*** and ***corresponds to*** some action, object or event.
3. The subject ***intends*** the act to stand for some action, object or event ***for an addressee,*** and for the addressee to recognize this intention.
4. It is ***not fully conventional*** (and normative).
5. It does ***not divide (semi)compositionally*** into meaningful sub-acts that ***systematically relate*** to other similar acts (as in grammar).

The Mimesis Hierarchy (Zlatev 2005, 2007, 2008a, 2008b)

Level	Acts
Post-mimesis 2 (= Language)	… dividing (semi)compositionally into meaningful sub-acts that systematically relate to other similar acts (as in grammar).
Post-mimesis 1 (= Protolanguage)	… that are conventional-normative
Triadic mimesis (Explicitly communicative)	… intended to stand for some action, object or event for an addressee, and for the addressee to recognize this intention.
Dyadic mimesis	… under conscious control and corresponding to some action, object or event
Proto-mimesis	… involving cross-modal mapping between exteroception (e.g. vision) and proprioception (e.g. kinesthesia)

A *layered* model



The Mimesis Hierarchy

- Consisting of five more or less distinct levels, each building cumulatively on top of the previous.
- Applied to human cognitive-semiotic evolution (Zlatev 2008b, **Lecture 4**).
- The levels are broadly defined: it is possible to apply the model to children's semiotic development without evoking "recapitulation" (Zlatev & Andrén 2009)
- **Claim: The five levels of the model correspond to five more or less distinct stages in the development of intersubjectivty**: from basic empathy to folk psychology.

What is a "stage"?

- The concept of *developmental stage* played a central role in nearly **all the classic theories of cognitive, emotional, and moral development of the XX century**, such as those of Montessori, Piaget, Kohlberg, Freud, Erikson and Vygotsky.
- In language acquisition, "it is possibly the most often used term" (Ingram 1989: 32).

What is a "stage"?

Since ca. 1990, the stage concept has come under much critique for

- being **inconsistently defined** (or not defined at all),
- failing to predict the varying performance of children in **different cognitive domains** (Gardner 1992),
- being **too discrete and static** (Siegler 1996)
- often **implying a complete replacement** and "dismantling" of the previous stage, while "no emerging domain disappears; each remains active and interacts dynamically with all the others" (Stern 1998: xii)"

What is a "stage"?

- "However, such critiques can be taken as implying the need to *improve* on the notion of developmental stage, rather than reject it." (Zlatev & Andrén 2009: 381).

DEF: a stage in semiotic development of X, is a (relatively stable) period in life, characterized by the consolidation of a novel cognitive-semiotic capacity, which may dominate the expression of X at this stage, but does not replace capacities from previous stages.

X = Intersubjectivity

3. Five stages of intersubjectivty

Stage	Novel capacity
1. Proto-mimesis	Empathetic perception
2. Dyadic mimesis	Volitional control and Imitation
3. Triadic mimesis	Communicative intent
4. Protolanguage	Communicative, conventional representations ("signs")
5. Language	Language-mediated folk psychology

The challenge

To provide:

1. An account of the factor(s) that organize(s) the **coherence** of a particular stage;
2. Link these factors with particular **behavioural manifestations**, as testified by empirical evidence;
3. Account for the factors bringing about a **transition** to a consecutive stage.

Stage 1: Empathetic perception *(0-9 months)*

- The phenomenological tradition (Merleau-Ponty 1962): a notion of **perception as active and empathetic**, in which the feeling body (*Leib*) "resonates" with the world, and especially with con-specifics.
- The "mirror-neuron" literature of the past decade (cf. Iacoboni 2008) has provided a series of hard-science confirmations of this conception, according to which in perception, the **actions of others are "mapped" onto one's own bodily actions and sensations**.

Stage 1: Empathetic perception *(0-9 months)*

- ***Neonatal mirroring*** (Metzoff & Moore 1977, 1983): newborn babies capable of **unintentionally** copying simple movements (mouth-opening, tongue-protrusion, lip-protrusion, hand movements)
- Caregivers engage in **"imitation games"**, e.g. matching the baby's first spontaneous smiles with their own.
- Infants thus spontaneously learn to share in the somatosensory states of others, and thus realize **a basic form of empathy.**

Stage 1: Empathetic perception *(0-9 months)*

- ***Emotional contagion***: crying "catches on"
- From 6 months, infants also begin to orient themselves in the direction where the other is looking: a form of ***attentional contagion*** (Zlatev, Brinck & Andrén 2008)

Not only human

- From 2 months: **"proto-conversations"** of caregivers and infants take on the quality of a rhythmic "dance", and frustration follows if this attunement is disrupted.
- From 3 months infants "show an awareness of others as attending beings, as well as an awareness of self as an object of others' attention" (Reddy 2003: 357), displayed in phenomena such as **mutual gaze, intense smiling, coyness, "calling" vocalizations, showing-off.**

Maybe only human

Stage 2: Volitional control and imitation *(9-14 months)*

- Considerable agreement that a transition in cognitive-semiotic development occurs around 9 months, though views vary on how to explain it.
- For Trevarthen & Hubley (1978) this marks the onset of **secondary intersubjectivity** involving triangulations between infant, adult and an external object.
- But why? Joint activities with objects are observed in some cultures/contexts much earlier (Rodriquez & Moro 2008), and in others much later…

Stage 2: Volitional control and imitation *(9-14 months)*

- "At about 9 months of age, infants begin to behave in a number of ways that demonstrate their growing awareness of how other persons work as psychological beings. They **look where adults are looking (joint attention), they look to see how adults are feeling toward a novel person or object (social referencing), and they do what adults are doing with a novel object (imitation learning).** ... Infants also at this time first direct **intentional communicative gestures** to adults, indicating an expectation that adults are causal agents who can make things happen." (Tomasello 1995: 175)

"9-month revolution"?

- Reddy (2005): infants display the marks of "understanding attention", in particular with respect to themselves, much earlier (Stage 1)
- "social referencing" begins from 7-8 months.
- "intentional communicative gestures": Tomasello blurs the distinction between:
  - **(a) gestures performed intentionally** (i.e. volitionally), and serving a communicative function;
  - **(b) gestures accompanied with marks of communicative intent**, especially those performed for the sake of informing an addressee ("declarative", "informative"): **later…**

Stage 2: Volitional control and imitation *(9-14 months)*

- A **"sense of a core self"** (Stern 1998) in which the body is felt to be "one's own" and under *volitional control*.
- **A much more precise and flexible form of *imitation***, and thus: a fuller understanding of the other "as a psychological being" (and vice-versa).
- ***Increases the awareness of a distinction between self and other*** and highlights the lack of direct control of others' actions (Werner & Kaplan 1964)
- along with that motivates attempts to influence them to perform actions that are desired:
  a surge of communicative signals, but not yet communicative intent

Stage 2: Volitional control and imitation *(9-14 months)*

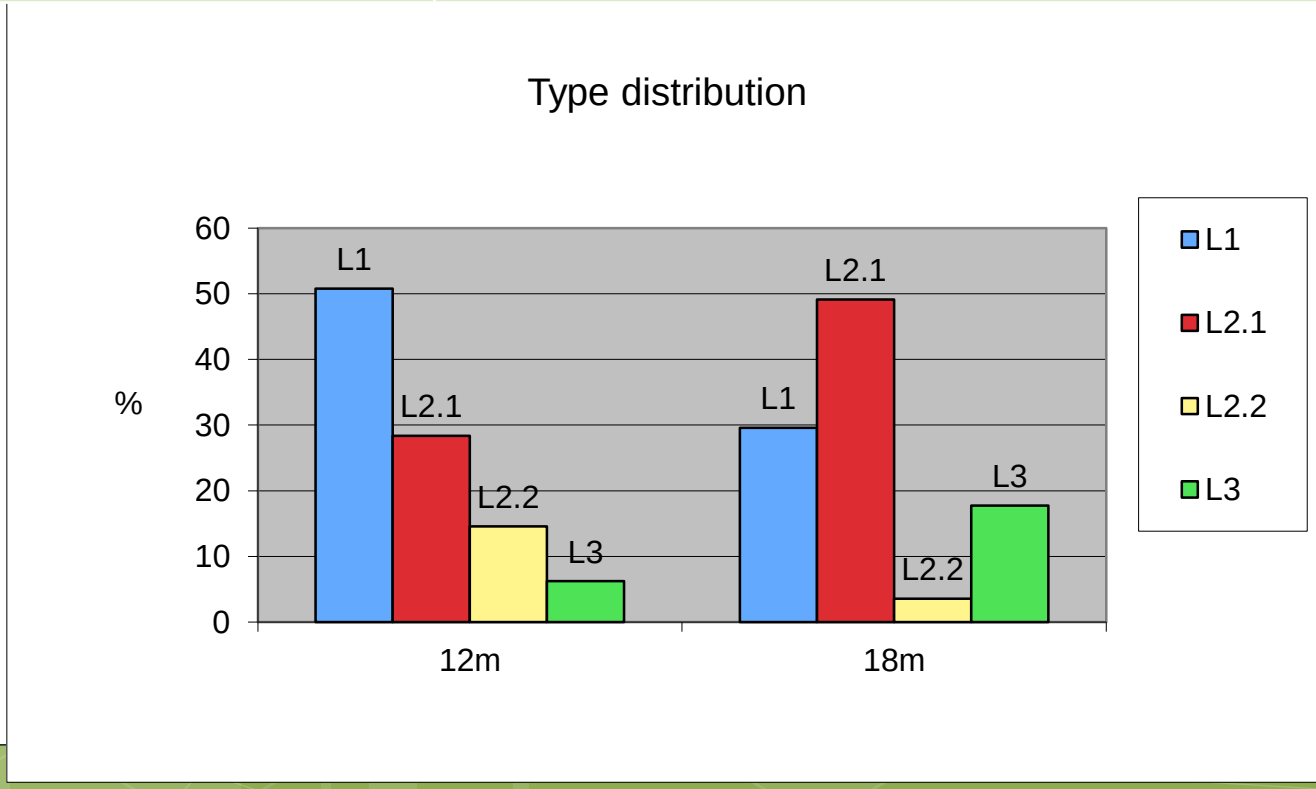
- **Mandler (2004):** infants during this age period are not only capable of direct, "sensorimotor imitation" (Piaget 1962), but also of ***generalized imitation***:
  - Observe pretend-actions toy-objects: FEED bird + CLEAN jeep
  - Given new objects (airplane, dog) and asked to "do like I did"
  - FEED dog + CLEAN airplane: **actions appropriate for category**
- **Deferred imitation**: "they begin to be able to reproduce event sequences after a delay" (Mandler 2004: 232)
- But ***representational imitation*:** "the interior image precedes the exterior gesture, which is thus a copy of an "internal model" that guarantees the connection between the real, but absent model, and the imitative reproduction of it" (Piaget 1962: 279)?

Not yet communicative intent…

- **Imperative points:** appear from 9 months, but even with gaze alternation between desired object and other person, they are relatively poor indicators of communicative intentions, since they can be learned as behaviours (Brinck 2003).
- **Declarative points:,** on the other hand, clearly indicate that the infant interacts with the other as a subject: "whereas declarative showing and pointing (with gaze alternation) first appear at around 9-10 months of age, **they do not occur with great frequency until 12-15 months of age**" (Carpenter, Nagell & Tomasello 1998: 20)
- Mostly the **simplest kind of perceptual intersubjectivity** (joint attention) at 12m.

(Zlatev, Brinck & Andrén 2008)

Level	Capacities
(1) Synchronous	A and B **synchronize** their (not intentionally communicative) actions in time and space
(2) Coordinated	A and B **coordinate** their (intentionally communicative) actions in time and space
(3) Reciprocal	A and B perform their (intentionally communicative) actions **in acknowledgement** to those performed by the other



Iconic gestures?

- Acredolo & Goodwyn (1988): starting from 9 months, infants are capable of learning many so-called "**baby signs",** which may become associated with a particular object or sensation

- "With encouragement from parents, babies can learn to associate dozens and dozens of gestures with specific things-like flapping arms for *bird*, smacking lips for *fish*, blowing for *hot*, or even patting the chest for *afraid*." (Acredolo & Goodwyn 2000: 84).

Not really…

- What "baby signs" indicate, once more, is ***mimesis as imitation***.
- There is no indication that the children are aware of either the conventional (mutually known) status of gestures, or of their representational, iconic character (Namy, Campbell & Tomasello 2004)
- Hence, still no:
  - mimesis in the sense of "mime", as in symbolic play
  - communicative intent necessary for Triadic mimesis…

Stage 3: Communicative intent *(14-20 months)*

- What heralds the onset of Stage 3 is precisely the understanding of ***communicative intent***, as a participant in acts of intentional communication, in both production and comprehension.
- The notion stems from Grice's (1957): to mean something by uttering/performing X is approximately equivalent to **intending X to (a) produce some effect on another individual and (b) for this individual to recognize that one is intending (a).**
- At least a higher-order intention (Sperber & Wilson 1986; Gomez 1994; Zlatev 2008a; Moore under review)

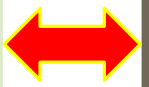
Stage 3: Communicative intent *(14-20 months)*

- **Communicative intent** and **Semiotic complexity** can be considered **independent dimensions**, though intermixing in a single communicative act (Andrén 2010; Moore in press)
  - An act performed with deliberate expressiveness for the sake of an addressee: **intentionally communicative**, irrespectively of whether it "stands for" something or not (Sperber & Wilson 1995).
  - A performance can function as a sign without there being a communicative intention, as when a child engages in **symbolic play** without anyone else present.

Zlatev (in press) Andrén (2010)

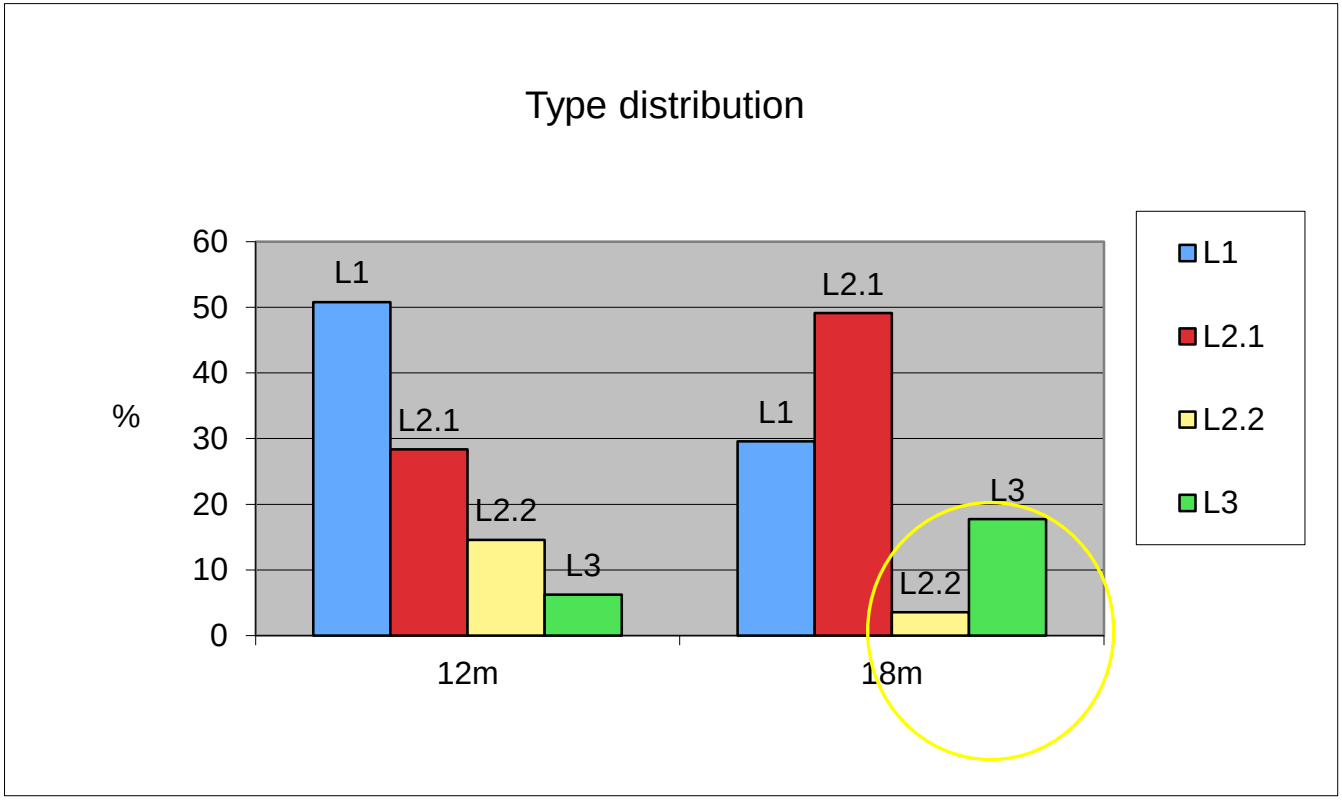
Communicative intent and *Semiotic complexity*

Level	Communicative intent (CI)
CI#3	Explicitly other-oriented action (Clear communicative intentionality)
CI#2	Action framed by mutual attunement (Unclear communicative intentionality)
CI#1	Side effect of co-presence (No visible communicative intentionality)



Level	Semiotic Complexity (SC)
SC#3	Explicit signs: Expression E **stands for** meaning M
SC#2	Typified acts: Expression E **counts as** doing action A
SC#1	Situation-specific acts: Expression E…

Stage 3: Communicative intent *(14-20 months)*

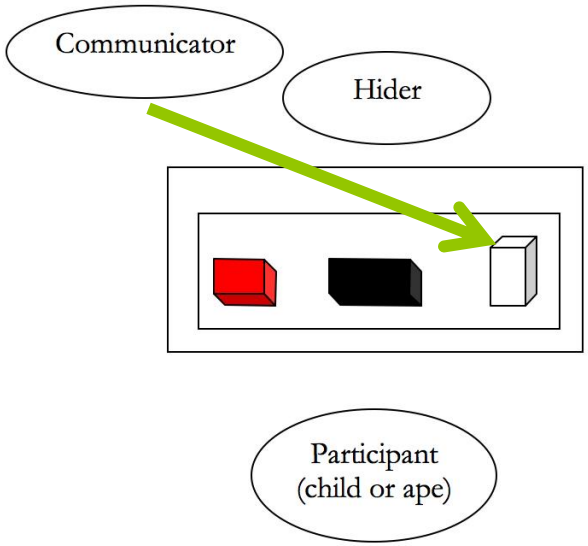


Characterized precisely by **"enacting communicative intent"** (Moore in press) in the form of gaze-alternation and mutual gaze (Zlatev, Brinck & Andrén 2008).

The "object choice task": a test for communicative intentions

Location of reward is communicated by differer type of cues:

1) Pointing to X
2) Placing a marker on X
3) Showing a replica of X
4) Showing a picture of X



Behne et al. (2005): 14-month old children could solve the object-choice task when the experimenter pointed to the correct box, **gaze-shifting between the box and the addressee, but not when pointing to the box while looking elsewhere.**

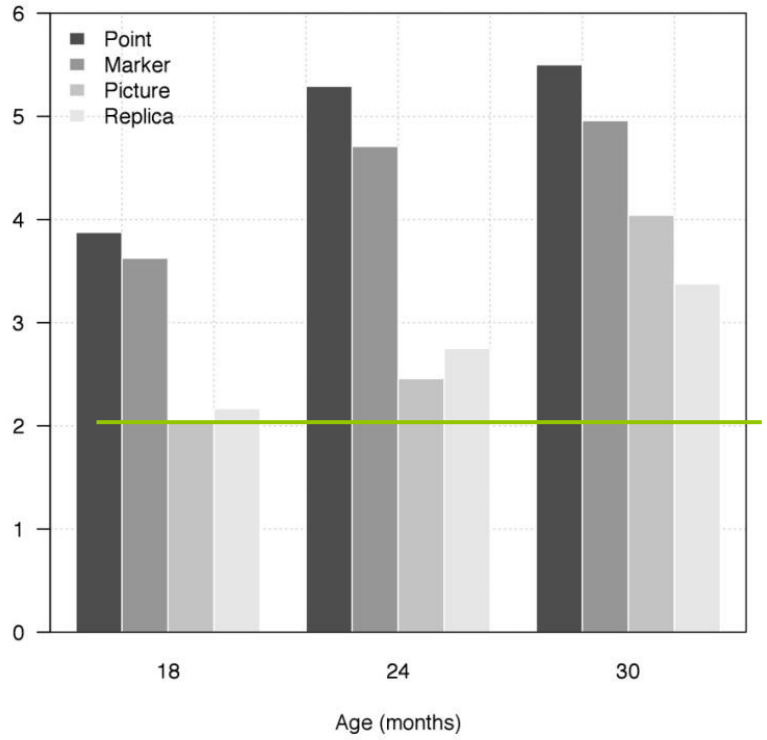
(Zlatev et al., 2013)

The communicator

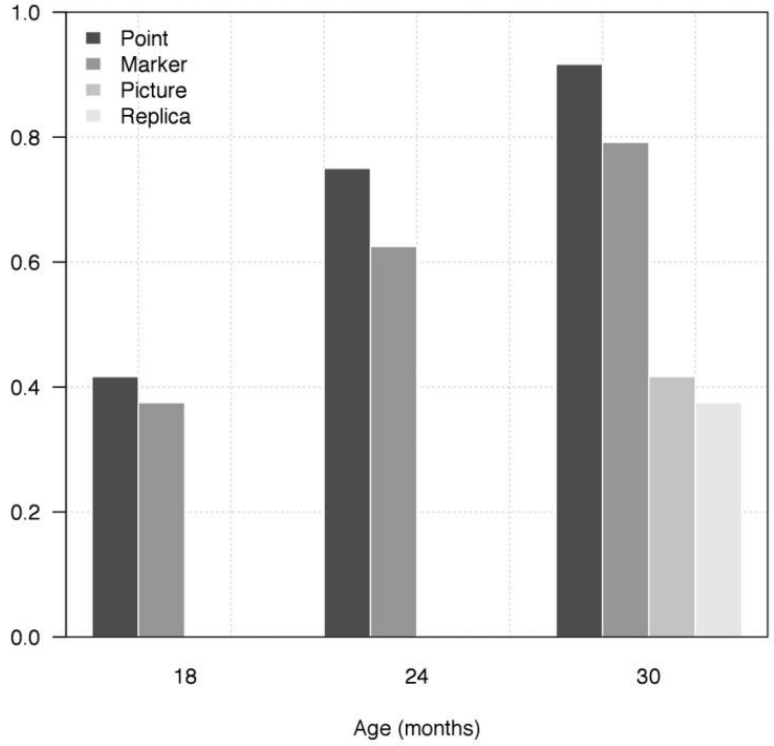
- Gets the participant's attention
- Expresses "helpfulness" by facial gestures
- Produces one of the following cues:
  - **Point** (Proximal, dynamic, index finger point to baited box)
    Gaze: BOX-CHILD
  - **Marker** (Places a yellow "post-it" note on top of baited box)
    Gaze: BOX-CHILD
  - **Picture** (Holds up photo of the baited box in mid position)
    Gaze: PHOTO-BOX-CHILD
  - **Replica** (Holds up an identical replica of baited box in mid position
    Gaze: REPLICA-BOX-CHILD

(Zlatev et al., 2013)

Why the difference?



Mean number of trials correct (Max = 6)



% children, at least 5 trials correct

Difference in "semiotic complexity"

Vehicle	Bodily	Ground	Direction	Representation
Ostensive gaze	**Yes**	**-**	**Yes**	**No**
Proximal point	**Yes**	**Indexical (+ Symbolic)**	**Yes**	**No**
Marker	**No/Yes**	**Indexical**	**No/Yes**	**No/Yes**
Picture	No	Iconic (+ Symbolic)	No	Yes
Replica	No	Iconic	No	Yes

U-curve in learning "arbitrary gestures" (Namy et al. 2004)

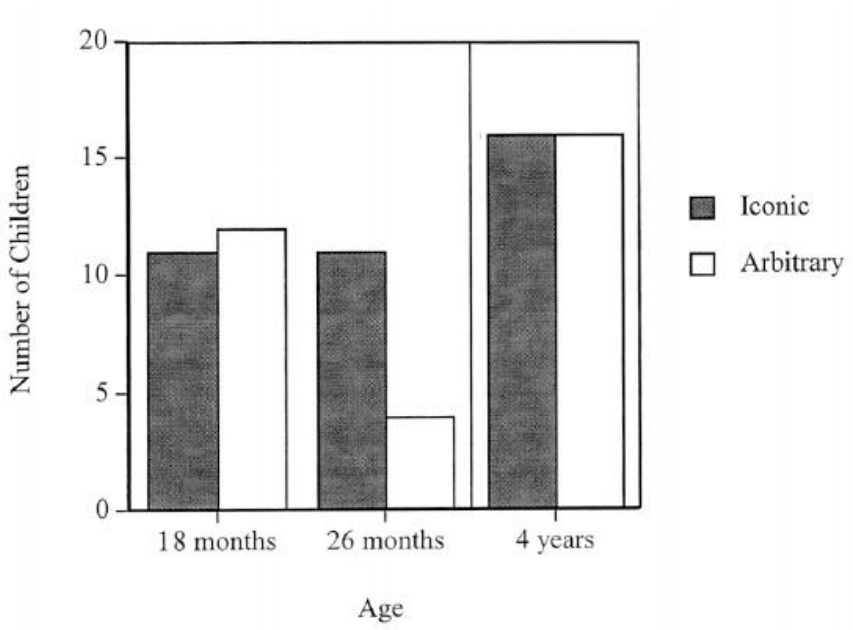


FIGURE 1 Number of children selecting target objects more often on target than control trials in each condition at each age ($n = 20$ per cell). Experiment 1 reports 18- and 26-month-olds' performance and Experiment 2 reports 4-year-olds' performance.

18-months children do not understand gestures qualitatively differently from the previous stages (e.g. the "baby signs"), i.e. as ***action schemas associated with a particular object or event***.

Stage 3: Communicative intent *(14-20 months)*

- *pace* Piaget (1962) and Zlatev & Andrén (2009), it is **not the understanding of representations ("the symbolic function")** that constitutes the major difference compared to the previous stage, but rather **the understanding of communicative intent.**
- Understanding *what* is being communicated is signaled by semiotic vehicles that performed with the body, allowing them to be readily imitated: POINT, GIVE, KICK, WIPE, FEED…
- A major step in semiotic development since it allows the further synergistic interaction between communicative intent and semiotic vehicles…

Stage 4: Communicative, conventional representations *(20-30 months)*

- *Swedish Early Communicative Development Inventory* (SECDI) (Berglund & Eriksson 2000): The median score in the most comprehensive measure
  - **35 for the 18-month old children**
  - **305 for those at 24 months, an increase of 900%.**

- "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 2002: 15).

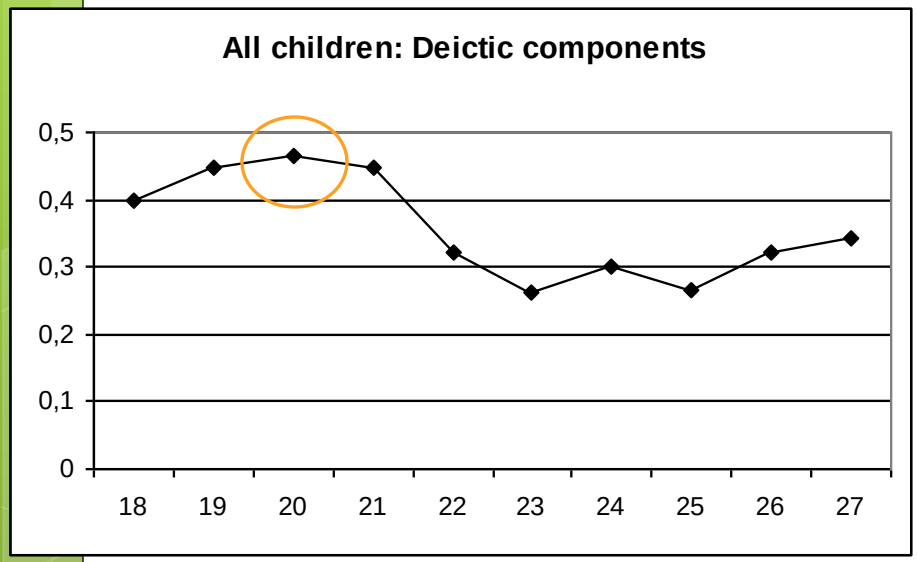
Other indications for transition

- "At 26 months, children have developed more rigid expectations than their younger counterparts about **the forms that object labels may take**" (Namy et al. (2004: 54).
  - In other words: infants expect "vocal labels" not to sound like what they refer to, but that gestures, when used as "labels", should resemble their referents.
- This explanation presupposes that during this stage, **infants have some degree of explicit awareness (if they are going to have different expectations) *that words and gesture are used "as labels", i.e. as signs***.

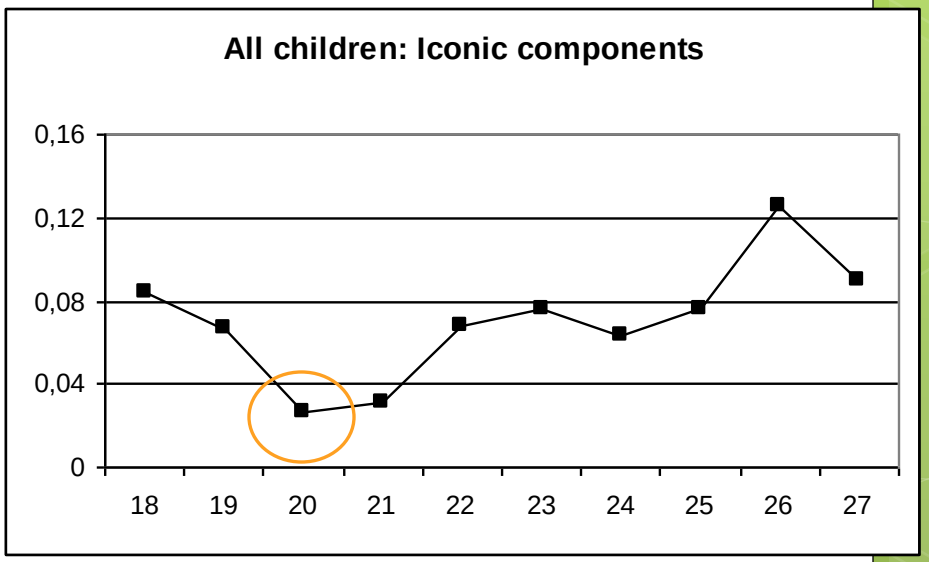
(Zlatev & Andrén 2009)

Other indications for transition

DEI: Top at 20 months, then decrease



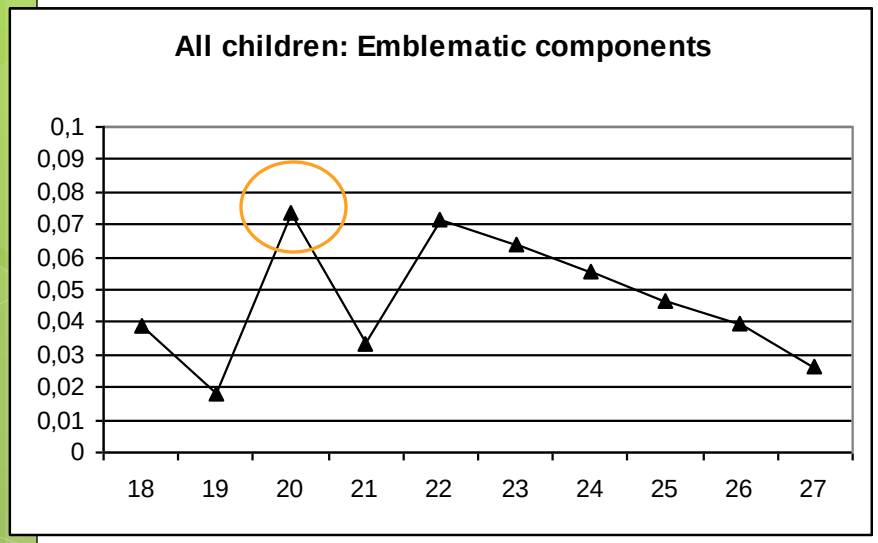
ICO: Bottom at 20 months, then increase



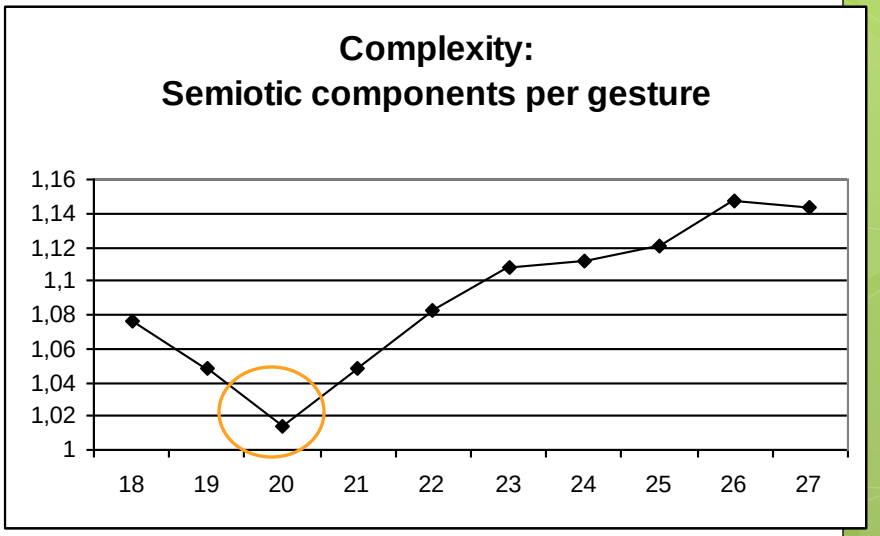
(Zlatev & Andrén 2009)

Other indications for transition

EMB: Unstable at first, top at 20, then decrease



Complexity: Bottom at 20 months,then increase



A "20-month revolution"?

- The common denominator to the vocabulary spurt, the U-curve in interpreting arbitrary gestures, and the observed gestural reorganization, is most precisely captured by the original term ***symbolic insight*, comprising the realization both that**
  - **(i) "things (and actions) have names",**
  - **(ii) that these names are common, i.e. conventional, and thus at least to some degree normative.**

Stage 4: Communicative, conventional representations *(20-30 months)*

- What makes the conventionality of "labels" more **normative** than that of actions, or mimetic schemas, is that misuse will tend to lead to misunderstandings, and frustrations of communication ("I want the DOG, not the BIRD").
- Throughout this stage, **grammatical norms begin to be acquired** through piece-by-piece imitations and "creative" generalizations (Tomasello 2003).
- This stage, which resembles "protolanguage" in evolution, should be viewed as **transitional**.

Stage 5: Language-mediated folk-psychology (*2.5 years -*)

- Once children have developed a sufficiently expressive **"conventional-normative semiotic system for communication and thought" (= language),** this inevitably has repercussions on their understanding of social cognition, yielding an additional stage in the development of intersubjectivity: **"folk-psychology"**

- Onset is marked by **production and comprehension of "complex sentences"** (highly individually variable)

The role of language for "theory of mind"

1. Structural features like **mental predicates** (verbs like *think, believe, know*) and **sentential complement** constructions (Astington & Jenkins 1999).
2. Discursive features like **disagreements, repairs and meta-linguistic discourse** (Lohmann & Tomasello 2003).
3. Linguistic proficiency brings first apprenticeship and then mastery in **understanding and producing narratives** (Bruner 1990; Nelson 1996; Hutto 2008)

So in sum…

The MH-model of intersubjectivity

	Stage	Novel capacity	Examples of cognitive-semiotic skills	Approximate age
1	Proto-mimesis	Empathetic perception	- neonatal imitation - emotional contagion - "proto-conversations" - synchronous (joint) attention	0-9 m
2	Dyadic mimesis	Volitional control and Imitation	- generalized/deferred imitation - coordinated (joint) attention	9-14 m
3	Triadic mimesis	Communicative intent	- declarative pointing - reciprocal (joint) attention - associative schemas	14-20 m
4	Protolanguage	Communicative, conventional representations ("signs")	- vocabulary spurt - reorganization of gestures - gradual increase in utterance complexity	20-30 m
5	Language	Language-mediated folk psychology	- complex sentences - discourse - onset of narrative	30 m -

Also: stages of subjectivity?

- Nelson (2003) argues that knowledge of "cultural myths and social narratives" has a constitutive role for forming **autobiographical memories**.
- Thus, **subjectivity and intersubjectvity are co-dependent**, and that development in one in intertwined with development in the other.
- Thus, the stage-model here presented can also be regarded as **a model of the development of self-hood**, which explains why it tallies to some extent with the one offered by Stern (1998).

4. Conclusions

Comparisons

- Unlike those who treat the development of intersubjectivity as gradual, with most capacities **essentially present "from the start"** and in need of unfolding (Trevarthen 1979; Reddy 2005)
- Unlike **two-stage models**: (1) enactive perception and interaction, (2) mediated by narrative (Gallagher 2005; Hutto 2008).
- Mostly similar to:
  - Stern (1998) on the development of "the sense of self"
  - Tomasello (1999) on "cultural origins of human cognition"
  - Nelson's (1996) application of Donald's evolutionary model to development

Continuity with past work

- The MH-model focuses on bodily mimesis, its "precursors" (empathetic perception) and "post-developments" (conventionality, language and narrative).
- **Mimesis is pivotal,** as in in Donald's evolutionary model, since it provides the basis for the development of
  - **conventions (through imitation),**
  - **intentional communication,**
  - **bringing the two together in communicative, shared representations (signs).**

"Language is different from mimesis, but is has mimetic roots. It is a collective product and must have evolved as a group adaptation, in the context of mimetic expressive culture. Given the conventional, collective nature of language, ***it could not have emerged in any other way***". (Donald 2001: 274)

Changes from past work

- **Stage 2 (9 months):** imitation and *mimetic schemas* (Zlatev 2007), but children's first gestures (or vocalizations) are neither externalizations of these "internal representations", nor fully-fledged representations/signs on their own, but action **schemas bi-directionally *associated* with particular contexts.**

- **Stage 3 (14 months):** the onset of intentional communication occurs with pointing and other deictic gestures: **not representations, but rather performative communicative acts, accompanied with makers of communicative intent.**

- **Stage 4 (20 months):** mimetic schemas (Stage 2) and the communicative intent (Stage 3) are combined to give rise to communicative iconic gestures, and more generally to the "insight" of using communicative, shared representations: "symbols" (Tomasello 1999; Namy et al. 2004) or "signs" (Sonesson 2009; Zlatev 2009).

Take-home points

1. The development of intersubjectivity in children proceeds in (five) stages, closely linked with other aspects of semiotic development.
2. Models of semiotic development need not be focused on specific skills and time periods, but can follow in the tradition of Piaget and propose more general integrational accounts.
3. Such models are needed for making scientific progress, despite the risk of being wrong in many of the particulars.
4. Understanding semiotic emergence in development helps to do so in evolution, on the basis of analogy.

Grazie per l'attenzione!