



# Five levels of self-awareness as they unfold early in life

Philippe Rochat

*Department of Psychology, Emory University, 532 North Kilgo Circle, Atlanta, Ga 30322, USA*

Received 27 February 2003

---

## Abstract

When do children become aware of themselves as differentiated and unique entity in the world? When and how do they become self-aware? Based on some recent empirical evidence, 5 levels of self-awareness are presented and discussed as they chronologically unfold from the moment of birth to approximately 4–5 years of age. A natural history of children's developing self-awareness is proposed as well as a model of adult self-awareness that is informed by the dynamic of early development. Adult self-awareness is viewed as the dynamic flux between basic levels of consciousness that develop chronologically early in life.

© 2003 Elsevier Inc. All rights reserved.

---

## 1. Introduction

Self-awareness is arguably the most fundamental issue in psychology, from both a developmental and an evolutionary perspective. In this paper, I discuss this issue from the point of view of development. I ask the questions: when do children become aware of themselves as differentiated and unique entity in the world? When and how do they become self-aware? Based on some recent empirical evidence, I identify **5 levels of self-awareness as they chronologically unfold from the moment of birth to approximately 4–5 years of age.**

The developmental approach in psychology is irreplaceable. It allows one to observe how basic competencies emerge and come on-line. By analogy, it compares to observing the construction of a skyscraper via daily photographs taken during the process (I am thinking of a postcard I have seen of the Eiffel tower in the various phases of its construction). It reveals what the final product is made of and the sequencing of each of its elements. It is some kind of a forward engineering.

In developmental psychology, one can observe forward engineering over and over again. Children are numerous, repeating patterns of growth that prefigure what we adults take for

---

*E-mail address:* [psypr@emory.edu](mailto:psypr@emory.edu) (P. Rochat).

granted, such as self-awareness. Indeed, what does it mean and what does it take to recognize oneself in a mirror? The response lays in children and their development of such capacity. At least that is what I would like to suggest here.

The general idea driving the paper is that prior to the expression of explicit self-awareness such as self-recognition and self-identification in a mirror or a photograph, infants from birth manifest an implicit sense of themselves. The questions of interest here are (1) what are the contrasted levels of self-awareness unfolding in early development? (2) what does this development tell us about the nature of self-knowledge in general?

### *1.1. Self-consciousness in development*

There is a general consensus on a few major landmarks in young children's psychological development such as the manifestation of the first social smile, the first independent steps, or the first words. All parents also notice an important change at around 2 years of age when children manifest "self-consciousness," the so-called secondary emotions such as embarrassment or pride in very specific situations such as mirror exposure or competitive games (Kagan, 1984; Lewis, 1992). Prior to the second year, an infant placed in front of a mirror will typically smile, coo, and explore in apparent delight of the perfect contingency between acted and seen movements bouncing back at them from the polished surface of the mirror (Amsterdam, 1972). By 2 years, the specular image is associated with radically different behaviors. Toddlers become typically frozen and sometime behave as if they wanted to hide themselves by tucking their head in their shoulders or hiding their face behind their hands. They show embarrassment. This is a robust phenomenon and one is naturally tempted to ask what it means psychologically for children in their development. The literary quote reproduced below captures this important transition:

There is a thing that happens with children: If no one is watching them, nothing is really happening to them. It is not some philosophical conundrum like the one about the tree falling in the forest and no one hearing it: that is a puzzler for college freshman. No. If you are very small, you actually understand that there is no point in jumping into the swimming pool unless *they* see you do it. The child crying, "Watch me, watch me," is not begging for attention; he is pleading for existence itself. M.R. Montgomery *Saying Goodbye: A memoir for Two Fathers*.

The poet Arthur Rimbaud claimed that "I is some one Else" ("Je est quelqu'un d'autre"), suggesting that we conceive ourselves through the eyes of others. It appears indeed that by 2–3 years young children do start to have *others in mind* when they behave. The expression of embarrassment that children often begin to display in front of mirrors at around this age is the expression of such "self-consciousness." They behave not unlike criminals hiding their face to the cameras. Their behavior indicates a drive to vanish from the public eyes, as if they came to grip via the experience of their own specular image of how they present themselves to the world. Not only do they discover in the mirror that it is themselves, they also realize that it is themselves as *perceived by others*. The malaise might come from the realization of a fundamental discrepancy between how the child represents herself from within, and how he or she is actually perceived by others as reflected in the mirror. Note that this interpretation is consistent with what visual anthropologist Edmund Carpenter reported in adults of an isolated Papua New Guinea tribe (the Biami). The Biami presumably did not have any mirror experience and the river in the Papuan plateau are typically too murky to provide clear reflections, unlike the rivers of ancient Greece enjoyed by Narcissus. The anthropologist recorded their reactions when looking for the first at

themselves in a mirror, viewing themselves in video recordings or Polaroid photographs. Carpenter describes reactions of terror and anguish: “They were paralyzed: after their first startled response—covering their mouths and ducking their heads—they stood transfixed, staring at their images, only their stomach muscles betraying great tension” (Carpenter, 1975, pp. 452–453).

If children begin to have “others in mind” by the age of 2 or 3 years, the question is how this self-consciousness comes about? I will suggest that there are at least 5 steps to this progression, each corresponding to different levels of self-awareness. I will first describe these 5 levels of self-awareness in contrast to a level 0 of no self-awareness. In this description, I will use as illustrations the various reactions to the mirror infants and young children manifest as a function of age. Mirrors have been criticized for lacking ecological validity (Loveland, 1986) and mirror self-recognition for not being a thorough index of self-awareness (Povinelli, 1995, 2001). However, reactions to mirrors remain a well documented, hence reliable (reproducible) behavioral index of developing self-awareness. I provide some empirical evidence of how levels of self-awareness unfold chronologically between birth and early childhood.

### *1.2. Various levels of self-awareness: The case of mirror reflection*

What do children see when they see themselves in a mirror? Do they see that it is themselves or do they perceive someone else facing them? When do mirrors and their reflection begin to be considered for what they are, namely a solid polished surface that reflects back? As illustrated by the image of Fig. 1, we can place surreptitiously a yellow “Post-It” piece of paper on a child’s forehead. We then play with him to confirm that the child is oblivious that his forehead is now advertising such a yellow mark. As illustrated by Fig. 1, if we now place the child in front of a mirror what does he see and what is he inclined to do? There are 6 possibilities, ranging from self-obliviousness (absence of self-awareness, referred here as “Level 0”) to self-consciousness. Beyond level 0, levels 1–5 correspond each to a particular level of self-awareness. I describe these levels below, starting with “Level 0” (absence of self-awareness), then proceeding in the order of the levels of self-awareness following their relative complexity, from implicit (Levels 0–2) to explicit (Levels 3–5) (Rochat, 1997, 2001).

#### *1.3. Level 0: Confusion*

This is the degree zero of self-awareness, level 0 at which the individual is oblivious of any mirror reflection, thus oblivious of the mirror itself. The specular image is confounded with the reality of the environment it reflects. It is perceived as a mere extension of the world, not a reflection of it. Birds flying into mirrors would express such level, as they sometime accidentally crash into windows. They mistakenly perceive mirrors as extension of the environment, not as differentiated objects. Pet owners know that placing a mirror in a canary cage is substitute for companionship and triggers in the bird melodious courtship songs. It is also the level expressed by dogs, cats, or monkeys facing mirrors and posturing endless aggressive displays to their own specular image as if they were confronting a creature other than themselves (Zazzo, 1981). *Note that this level also characterizes moments of absence when we, adult humans, perceive and sometime frighten ourselves for an instant when experiencing our own mirror reflection as another person surreptitiously facing us.*



Fig. 1. What's in the mirror? Western Samoan child confronted with his mirror reflection after a yellow "Post-It" sticker was surreptitiously placed on the top of his forehead (Photo P. Rochat) (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.).

#### *1.4. Level 1: Differentiation*

This is the first sign that the individual is not oblivious of mirrors as reflection. At this level, there is a sense that what is perceived in the mirror is different from what is perceived in the surrounding environment. More specifically, when perceiving the own specular image, the individual picks up the fact that there is something unique about the experience, namely that there is a perfect contingency between seen and felt movements. Beyond the confusion of the preceding level, this level entails some basic perceptual differentiation. Differentiation between the experience of own bodily movements as reflected in the mirror and the direct experience of other moving entities in the world. This is a first level of self-world differentiation: a differentiated self is expressed.

#### *1.5. Level 2: Situation*

Beyond the differentiation of the uniqueness of self-produced movements seen on the surface of the mirror, the individual now is capable of systematically exploring the intermodal link between seen movements on the mirror surface and what is perceived of the own body proprioceptively. In other words, individuals now go beyond the awareness of matched surface characteristics of seen and felt movements. They also explore how the experience of their own body relates to the specular image, an image that is out there, projecting back at them what they feel from within.

As compared to the preceding level, this can be viewed as first signs of a contemplative stance toward the specular image, a sort of *proto-narcissistic* stage guided by self-exploration on a projected surface. At this level, there is no confusion. The individual is aware that what is seen on the mirror is unique to the self. In addition, the individual is also aware that what is seen is “out there,” on a surface that is spatially situated in relation to the body: a situated self is expressed.

### 1.6. Level 3: Identification

At this level, the individual manifests recognition, the fact that what is in the mirror is “Me,” not another individual staring and shadowing the self. There is more than differentiation and situation of self in relation to the specular image. This level is expressed when children refer explicitly to the self while exploring their own specular image. As illustrated in Fig. 2, in the case of the “Post-It” sticker surreptitiously placed on the child’s forehead prior to mirror exposure, the child discovers it in the mirror and reaches for it for touch or removal. This behavior is typically considered by developmental psychologists as the index of an emerging conceptual self (Lewis & Brooks-Gunn, 1979; Bertenthal & Fisher, 1978; Rochat, 1995), but also as a major cognitive landmark by evolutionary psychologists (Gallup, 1982; Povinelli, 1993). At this level, the individual is capable of referring the specular image to the own body, the latter being the referent of



Fig. 2. The child manifests self-recognition (*Level 3*) by reaching toward the yellow “Post-It” mark discovered in the specular image (see Fig. 1 for an immediately preceding snapshot of the same child. Photo P. Rochat) (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.).

what is seen in the mirror. There is an identity relation between the self as experienced from within and what is displayed on the polished surface of the mirror: an identified self is expressed.

### 1.7. *Level 4: Permanence*

The self is identified beyond the here and now of mirror experience. It can be identified in pictures and movies taken in the past, where the self might be significantly younger, at a different location and dressed in different cloths. In other words, the identification of the self is not tied to the temporal simultaneity and spatial coincidence of the body and its reflection whether in live videos or specular images. The individual manifests a sense of self that perdures the immediacy of mirror experience. A permanent self is expressed: an entity that is represented as invariant over time and appearance changes.

### 1.8. *Level 5: Self-consciousness or “meta” self-awareness*

The self is now recognized not only from a first person perspective, but also from a third person's. Individuals are not only aware of what they are but *how* they are in the mind of others: How they present themselves to the public eye (Goffman, 1959). The public outlook on the self is simulated for further evaluation of how one is perceived and valued by others. The result of this evaluation, more often than not is either a devaluation or a delusion, linked to so-called “self-conscious” emotions or attitudes such as pride or shame. A self-conscious self is expressed: an entity that is simulated and projected in the mind of others.

## 2. A natural history of self-awareness informed by infancy research

### 2.1. *Self-world differentiation at birth*

Recent empirical findings suggest that infants do not come to the world with the *exclusive* expression of self-obliviousness corresponding to *Level 0*, the degree zero of self-awareness as described above. It appears that immediately after birth, infants are capable of demonstrating already a sense of their own body as a differentiated entity: an entity among other entities in the environment (*Level 1*). This is evident, for example, when observing the rooting response of newborns and what triggers it. When touching the cheek of newborns, they tend to orient their head toward the touch stimulation. This response is highly predictable and part of the routine neurobehavioral assessment of neonates (Amiel-Tison & Grenier, 1980).

In a recent study, we compared such response in 24-h-old infants following either a tactile stimulation originating from the index finger of the experimenter or from self-stimulation, infants spontaneously bringing one of their hands in contact with a cheek. Systematic comparison shows that neonates do root significantly more to external compared to self-stimulation (Rochat & Hespos, 1997). From birth, infants differentiate between self- vs. non-self touch, between stimulation originating from either the own body or an external source. Contrary to the assumption of many classic theories of child development, infants are not born in a state of fusion or confusion with environment (the “blooming, buzzing, confusion” proposed by William James, 1890). They

do show some rudiments of self-world differentiation. The question is what might be the origins of such innate capacity? I propose that at the origins, there are some basic perceptual experiences that are *uniquely specifying* the own body as opposed to the experience of other entities in the world.

When infants experience their own crying, their own touch, or experience the perfect contingency between seen and felt bodily movements (e.g., the arm crossing the field of view), they perceive something that no one but themselves can perceive. The transport of the own hand to the face, very frequent at birth and even during the last trimester of pregnancy, is a unique tactile experience, unlike any other tactile experience as it entails a “double touch”: the hand touching the face and simultaneously the face touching the hand. Same for the auditory experience of the own crying or the visual-proprioceptive experience accompanying self-produced movements. These basic perceptual (i.e., multimodal) experiences are indeed self-specifying, unlike any other perception experienced by the infant from birth and even prior to birth in the confine of the maternal womb.

Young infants appear to pick up the invariant information that specifies the own body as a differentiated entity, an entity that is experienced differently from other physical bodies or objects that are *out there* in the environment. Aside from our own research, there is an abundance of experimental studies with newborns and very young infants that suggest the existence of early self-world differentiation (see for example Meltzoff & Moore, 1995 regarding neonatal imitation; Jouen & Gapenne, 1995 regarding visual-vestibular coordination at birth; see also Butterworth & Hicks, 1977; Rochat, 1995, 2001 for a review).

## 2.2. *Situated self from 2 months of age*

By the end of the second month, infants show clear signs that in addition to self-world differentiation, they also have a sense of how their own body is *situated* in relation to other entities in the environment (*Level 2*).

If infants from birth show a propensity to imitate facial expressions such as tongue protrusion (Meltzoff & Moore, 1977) or basic emotions such as joy or sadness (Field, Woodson, & Greenberg, 1982), by the second month they demonstrate systematic matching that denote a novel sense of how they relate to the model they imitate. In a remarkable experiment, Meltzoff and Moore (1992) showed that 6 week-olds tend to copy systematically the orientation of the tongue protrusion of an adult model pulling her tongue either to the right or to the left, as opposed to midline. This imitative response of the infants indicate that, not only do they reproduce the global tongue protrusion act, something they are capable of from birth, they also approximate the directionality of the modeled tongue movements. This entails that in addition to differentiating their own actions from those of the model, they are also capable of mapping their own bodily space to the bodily space of the model. With this sophisticated imitative behavior, infants appear not only to differentiate themselves but also to situate themselves in relation to the perceived model. What is particularly striking in the observations reported by Meltzoff and Moore (1992), is the fact that by the second month infants are actively approximating the tongue orientation of the model, engaged in active exploration until they map the target action. Based on microanalyses of the videotapes, Meltzoff and Moore document that infants typically start to pull their tongue at midline, slowly and with apparent effort bringing it to the side while staring at the model. This active exploration is an index of both differentiation and situation of the infant in relation to the adult model facing her.

In a related perception-action study, we recently found that by the second month, infants become actively involved in exploring and contemplating the consequences of their own actions in the environment (Rochat & Striano, 1999). We recorded young infants' oral activity while introduced with a pacifier connected to a sound producing device. Each time the infants applied oral pressure on the pacifier above a low threshold, they heard a perfectly contingent succession of discrete sounds with a particular pitch variation. In one condition, the pitch variation was an analog of the oral pressure applied on the pacifier, with an ascending and descending pitch variation mapping the increase and decrease of oral pressure. In another condition, the pitch variation was a non-analog of the oral pressure, varying randomly. We found that the infants' oral activity on the pacifier was markedly different in either the analog or non-analog condition.

Interestingly, we tried to replicate these findings with a group of newborns but did not find any evidence of such differential activity, these younger infants demonstrating no sign of discrimination between the two conditions. By the second month, infants thus appear to be newly exploring the perceptual events they produce in the environment adopting what can be described as a contemplative stance (Rochat, 2001). Presumably, this developing stance implies both differentiation (*Level 1*) and situation (*Level 2*) in relation to the object of contemplation.

In the social realm, and corresponding also to the emergence of the contemplative stance, infants by the second month begin to smile when playfully engaging in face-to-face interactions with another person. The infants are expressing a novel sense of shared experience with others. When infants by the second month begin to engage in so-called *protoconversations* via turn taking, imitation, affective mirroring, and mutual monitoring, all imply a sense of self that is differentiated and situated in relation to the conversing partner they share experience with (Gergely & Watson, 1999; Rochat, Querido, & Striano, 1999; Rochat & Striano, 1999b; Rochat, 2001b; Stern, 1985; Trevarthen, 1979).

Finally, probably the less ambiguous demonstration of Level 2 self-awareness is when infants start systematically to reach for objects they see, deliberately bringing their hands in contact with objects. By 4 months, normally developing infants become "touch all" or "touche à tout" as the French say. They express systematic eye-hand coordination. However, they do so selectively.

We observed that from the time they are capable of reaching, infants are sensitive to the situation of their own body in relation to the object they reach, namely the distance that separates them from the object. In addition, they calibrate their decision to reach in relation to their postural degrees of freedom, whether they are more or less able to move forward toward the object without losing balance and falling onto the ground. Infants are capable of eye-hand coordination long before they are capable of maintaining postural stability while sitting. Early reaching is therefore challenging the infant's overall body balance. In a series of studies we found that 4- to 6-month-old infants' decision to reach toward an object placed at various distances and locations in front of them was determined by their own sense of situation and postural ability (Rochat, 1992; Rochat & Goubet, 1995). For an object presented at the same reachable distance, infants varied in their propensity to reach depending on their sitting ability. We also found in infants of comparable sitting ability, hence with comparable postural degrees of freedom, that their attempts to reach for an object varied whether we attached weights to their wrists (Rochat, Goubet, & Senders, 1999). These weights brought back the center of mass of their body, therefore adding to their balance problem as they reach forward toward the object. We found that in the weight condition, infants are less inclined to reach, despite the fact that they have no problem moving



their arm around with the loaded bracelet. In short, these observations clearly indicate that infants have a sense of self not only as differentiated (*Level 1*) but also as situated in relation to what the environment affords for action (*Level 2*).

### 2.3. *The birth of “Me” by the second year*

Until the middle of the second year when linguistic and symbolic competencies start to play a major role in the psychic life of children, self-awareness remains *implicit*. It is expressed in perception and action, not yet expressed via symbolic means such as words. Prior to approximately 14–18 months there is yet no clear evidence that the children perceive traces of themselves, as *standing for* themselves, only themselves, and no one else, such as the little footprints they might leave in the mud or the image they see in the mirror.

Infants do however, months earlier, discriminate between their own image and the image of another infant. Preferential looking studies show that by 5–6 months infants tend to be significantly more captivated by a pre-recorded video of another, same age infant, compared to a pre-recorded video of themselves wearing an identical, same color outfit (Bahrick, Moss, & Fadil, 1996). It appears that by this age, and presumably via previous exposure to mirrors and other self reflecting devices, infants pick up invariant features of their own face. It does not mean however that they construe these features as standing for themselves. It is the product of perceptual learning of subtle invariant facial features they quickly become familiar with. When placed in a situation where they have the choice to explore either their own familiar face or the face of another child, they show a typical preference for novelty (e.g., Fantz, 1964; Rochat, 2001). Although certainly a necessary precursor and a sign of remarkable perceptual learning ability, this preference does not mean yet that infants do *recognize* that it is themselves on the TV.

The same kind of interpretation applies to our recent findings that 4- and 7-month-olds show clear discrimination between seeing themselves live on a TV while moving around in their seat versus seeing a live experimenter on a TV engaged in the systematic imitation of what the infant is doing (Rochat & Striano, 2002). In our experiment, the experimenter shadowed the infant as mirrors do. We found that infants smiled, vocalized, and looked differentially at the imitating experimenter seen on TV compared to the self. In addition, infants tended to react differentially in either condition when the image was suddenly frozen in “still-face” episodes.

In all, young infants demonstrated once again their perceptual ability to distinguish between the familiar sight of themselves and the novelty of the experimenter appearing on the TV, the age variable, notwithstanding the inescapable lack of perfect contingency in the Experimenter’s shadowing of the infant’s own actions (see Rochat & Striano, 2001; Rochat & Striano, 2002, and Rochat, 2001, for further discussion).

Despite all these remarkable perceptual discriminability between what pertains to the self and what pertains to others, up to the middle of the first year infants are oblivious that some rouge has surreptitiously been smeared on their face or that a yellow “Post-It” might appear on their forehead when looking at their own specular image (Bertenthal & Fisher, 1978; Povinelli, 1995). It is only by 18 months that, as shown in Fig. 2, infants start to reach for the mark on their own body, often in order to remove it (*Level 3*). This behavior is considered by most developmental and comparative psychologists as the Litmus test of self-awareness (but see Loveland, 1986, for a critic of this view). It is often viewed as the evidence of a conceptual or “represented” sense of self

in any organism behaving like this in front of mirrors, whether the human child, non-human primates, avian, mammals like elephants, or even cetaceans like dolphins (Parker, Mitchell, & Boccia, 1994). But why? It is mainly because by showing this behavior, individuals demonstrate the ability to refer to the specular image as standing to their own body. In other words, they refer the silhouette they see reflected in the mirror to precise regions of their own body they cannot see directly (e.g., their forehead). This would be impossible without a body schema or own body representation that is mapped onto what is seen in the mirror. Therefore, this behavior indicates that the mirror reflection is seen by the individual as standing for this representation (*Level 3*). It is identified as referring to the body experienced and represented from within, not anybody else's. Identity is used here in the literal, dictionary sense of “recognizing the condition of being oneself, not another” (Random House Unabridged dictionary).

In relation to the above formulation, mirror self-recognition expressed via the “successful” passing of the mark test is predictably linked to major progress in symbolic (referential) functioning of the child in other domains, in particular language development.

By 18 months, infants also start to mark contrasts between themselves and other people in their verbal production. They express semantic roles that can be taken either by themselves or by others (Bates, 1990). An explicit, hence reflective conception of the self is apparent at the early stage of language acquisition, at around the same age that infants begin to recognize themselves in mirrors. This chronological link in development provides indirect validation of the mirror test and the interpretation I provided above. Indeed, as argued by Bates (1990), language acquisition requires a preexisting conceptual or represented sense of self as “Me” as opposed to simply “I”: “a theory of the self as distinct from other people, and a theory of the self from the point of view of one's conversational partners.” (Bates, 1990, p. 165).

#### 2.4. *The birth of Me extending over time*

If infants identify themselves in mirrors starting 18 months, they still demonstrate that the *Me* they identify in the specular image remains enigmatic and ambivalent. They appear to still oscillate between an awareness of the self and an awareness of seeing someone else facing them (Piaget, 1962; Povinelli, 2001; Rochat, 2001). Identifying oneself in the mirror is a major feat, not only for the referential mapping between the mirror reflection and the own body schema, but also because what the child sees in the mirror is the way he or she always sees others: in an “en face” posture often with eye contact. In relation to this basic experience of social encounters, what the child experiences in the mirror might be “Me,” but it is also what others typically look like. The child therefore has to suspend and override their overall visual experience of others, the specular image standing for “Me as an other” (Me but Not Me dilemma, Rochat, 2001; see also from a psychoanalytical perspective Jacques Lacan's account of “the mirror stage”).

The mirror experience of the self carries this fundamental ambiguity and children struggle with it, as we will see, until at least their fourth birthday. Note that this ambiguity is pervasive all through the life span. As adults, we look at ourselves in mirrors, working on our presentation by simulating or representing the looking of others on our own body. What we are seeing, is *de facto* our appearance as seen by others, hence the pretense of someone else.

In his seminal observations of his own children, Piaget reports anecdotes that pertain to the mirror dilemma. Jacqueline, aged 23 months, announces to her father as they are coming back

from a walk, that she is going to see her father, her aunt, and herself in the mirror. Perfectly capable of identifying herself in the mirror as “Me” when prompted by her father asking “who is there?”, Piaget observes that Jacqueline provides also at time a *third person* account of what she sees in the specular image. Likewise, she tends to oscillate between claiming that it is “Me” or that it is “Jacqueline” when viewing photographs with herself on it (Piaget, 1962, pp. 224–225).

More recently, as part of a series of ingenious studies on the developmental origins of self-recognition, Povinelli reports the commentary of a 3 year-old viewing herself on a TV with a sticker on her forehead. She says: “it’s Jennifer... it’s a sticker” and then adds: “but why is she wearing my shirt?” (Povinelli, 2001, pp. 81).

In all, these observations illustrate once again the Me-But-Not-Me dilemma, children struggling with it months after they show signs of self-identification in mirrors. The recent research of Povinelli and colleagues demonstrate that children slowly bypass the Me-But-Not-Me dilemma when viewing live or pre-recorded videos of themselves. For example, 3 year-olds and younger do tend to reach for a large sticker they see on top of their own head while viewing a live video of themselves. In contrast, they do not when viewing the replay of the same video taken only 3 minutes prior. Furthermore, when asked who was on the TV, it is only by 4 years that the majority of children say “Me” rather than their proper name suggesting a first person stance rather than a third (see Povinelli, 1995, 2001 for a review and discussion of this research).

The careful empirical work of Povinelli and colleagues on delayed self-recognition shows that it is not prior to approximately 3 years that children begin to grasp the temporal dimension of the self. That the self pertains not only to what is experienced now but also to what was experienced then, what can be seen in a mirror now or in a movie tomorrow: the same enduring self (*Level 4*).

### 2.5. *Others in mind: Evaluative and the meta-cognitive self-awareness*

By the time young children begin to express and recognize themselves as enduring entities, they also begin to show major advances in their understanding of others. By 4–5 years, children begin to be capable of holding multiple representations and perspectives on objects and people. They can for example infer the particular age, relative sentience, temperament, and emotionality of a person by merely looking at the quality of a simple drawing. By this age, children infer the mind and affects of the artist behind a graphic symbol (Callaghan & Rochat, 2003). This ability is linked to the developing child’s ability to construe false belief in others, as well as to grasp the representational status of graphic and other symbolic artifacts such as maps, photos, or scale models (Callaghan & Rochat, 2003; DeLoache, 1991; Olson & Cambell, 1993; Perner, 1991).

The development of representational abilities in general and theories of mind in particular corresponds also to evidence of meta-awareness in relation to the self (*Level 5*). For example, when children begin to understand explicitly that another person holds a false belief, they necessarily understand that they themselves hold the right belief. In the same way, when infants demonstrate some construal of object permanence, they also demonstrate their own permanence in relation to objects (Rochat, 2001). These terms are inseparable.

The expression of embarrassment in front of mirrors by the second year can be interpreted as the first signs of young children awareness of their public appearance and how others perceive them. As proposed earlier, by this age children begin to experience the basic fear generating

realization of a gap between how they perceive themselves from within and what actually people perceive from the outside.

An alternative interpretation would be that young children shy away from their reflection in the mirror, not because they are “self-conscious,” but rather because they wrongly construe the presence of another child staring at them with some kind of a persistent still face. But this is doubtful considering, as we have seen, that very early on infants discriminate between seeing themselves or seeing someone else in a video (Bahrick et al., 1996; Rochat & Striano, 2002).

By showing embarrassment and other so-called secondary emotions (Lewis, 1992), young children demonstrate a propensity toward an evaluation of the self in relation to the social world. They begin to have others in mind, existing “through” in addition to “with” others.

Secondary emotions such as the embarrassment children begin to express by 2–3 years parallel and are probably linked to the emergence of symbolic and pretend plays. Such plays entail, if not at the beginning but at least by 3–4 years, some ability to simulate events and roles, to take and elaborate on the perspective of others (Harris, 1991; Striano, Tomasello, & Rochat, 2001; Tomasello, 1999; Tomasello, Striano, & Rochat, 1999).

The process of imagining what others might perceive or judge about the self, whether this imagination is implicitly or explicitly expressed, is linked to the cognitive ability of running a simulation of others’ minds as they encounter the self. There is fantasy and phantasms involved, the stuff that feeds the self-conscious mind and characterizes the meta-cognitive level of self-awareness (*Level 5*). Note that the articulation in development between the evaluative sense of self expressed at level 4 via embarrassment and the meta cognitive awareness of level 5 remains for the most part a mystery and would deserve much more experimental scrutiny.

### **3. Conclusions: Toward a model of self-awareness that is informed by early development**

The development of self-awareness early in life reveals layers of processes that expand from the perception of the body in action to the evaluative sense of self as perceived by others. It reveals also what mature self-awareness is made of. I propose that the self-awareness experienced by adults is made of the 5 basic levels discussed here.

Self-awareness is a dynamic process, not a static phenomenon. As adults, we are constantly oscillating in our levels of awareness: from dreaming or losing awareness about ourselves during sleep, to being highly self-conscious in public circumstances or in a state of confusion and dissociation as we immerse ourselves in movies or novels. In fact, each of these oscillating states of self-awareness can be construed as constant transition between the 5 levels emerging early in life. These levels form the degrees of liberty of self-awareness as a constantly fluctuating process.

To borrow from dynamic systems jargon, these levels would form a collection of basic *attractors* in the process of self-awareness. These attractors would be universal, shared by all mature individuals. In other words, all mature individuals (i.e., individuals that reached level 5 of meta-cognitive self-awareness) fluctuate around the 5 levels we described in the perspective of development, including also Level 0 of self-obliviousness where self-awareness is temporarily obliterated. Accordingly, what changes among mature individuals, is the rhythm and fluctuating patterns of oscillation among these basic levels of self-awareness. Some people are more prone to dwell in states of confusion while abandoning their embodied self in the saga of a novel or a

movie. They are particularly inclined to enjoy the projection of themselves into another (non-self) being, reacting as if they were part of the screen or the book. Hypothetically, it would correspond to a mature expression of Level 0 (self-world confusion) expressed in a state of hyper vigilance. However, Level 0 also manifests itself when we sink into a non-REM sleep state of hypo vigilance with no consecutive dream recollection. Note that the issue of self-abandon is a complex and controversial issue that would deserve more discussion.

**As adults, we do indeed manifest all of the levels of self-awareness developing early in life: from our immersion in skilled actions such as competitive sport which entails a great deal the implicit self-awareness of Level 1 (differentiation) and Level 2 (situation).** Interestingly, if one rises to the next levels of explicit self-awareness (Level 3 and above) while engaged in skilled actions such as playing tennis or golf, this transition is associated with dramatic changes in performance, typically a deterioration. Tennis and golf players will tell you that if they step into explicit self-consciousness, erring into explicitly thinking and reflecting on what they are doing, their game tends to collapse. There is nothing worse for tennis players than self-reflecting on the shape of their backhands. The same applies for people engaging in meditation. People meditating and teachers within the Buddhist tradition for example, will tell you that certain states cannot be attained without emptying oneself from self-reflecting mental activities.

Adult meditation techniques revolve around the control of explicit self-conscious awareness, in particular the control of undesirable slippage from one level of self-awareness to another. Movie directors by attempting to enthrall their captive audience, try as well to control such slippage, by actually encouraging them. In general, and maybe with the exception of avant-garde movies that apply Berthold Brecht's distancing principles by which spectators should not leave their "intelligence" at the cloak room of the theater, movie directors attempt at captivating spectators, inviting them to lose grip with themselves. If a movie is successful, spectators will abandon themselves into the screen, becoming the protagonists of the story they follow. The screen becomes not only alive with moving pictures, but a simulation of a reality where spectators become someone else in an imaginary realm that is supported by vivid images, notwithstanding a sophisticated editing language that provides syntax to these images.

Although it might be reasonable to account for self-awareness as a dynamic fluctuation between at least 5 levels of consciousness and one level of self-obliviousness (Level 0), the heuristic value of such model is limited when considering that individuals are more often than not self-aware *with others*, not on their own. The social dimension of self-awareness was not treated here and needs to be at least mentioned. The fact is that we are never aware outside of a social context, whether real or virtual. In relation to social-cognitive development, infants and children show that they develop to become "co-aware" of the world, including themselves. They develop awareness *with others*, not independently of others. Somewhere else, I proposed that the individual awareness of the physical or social world is a myth, too often upheld or at least implied in existing theories about cognition (Rochat, 2001; in press). Cognitive psychologists tend to isolate conscious experience from the social realm. Once taking into account that awareness is co-constructed with others, not constructed by the individual alone, things get infinitely more complex.

Considering that self-awareness is a co-construction (constructed in interaction with others, Rochat & Striano, 1999; Rochat, in press), the model proposed in this paper is obviously incomplete. However, it presents some heuristic advantages. For one, it is informed by empirical

observations as to how the awareness of the own body develops early in life. Secondly, it shows that what emerges chronologically in development are levels of self-awareness. I proposed that these levels might constitute the basic attractor states of mature self-awareness.

The heuristic value of this simple model is that it helps in the account of a fundamental, often overlooked aspect of self-awareness: the fact that self-awareness is not singular, but multiple. It is dynamic, in constant flux between levels of various experiential qualities, until death to come.

Infants in their development tell us what these levels of self-awareness are. To end with a garden metaphor, self-awareness develops like onions, layers after layers, in a cumulative consolidation. Accordingly, self-awareness is the experience of ourselves fluctuating through these layers as we act, perceive, and think in the world.

## References

- Amiel-Tison, C., & Grenier, A. (1980). *Evaluation neurologique du nouveau-né et du nourrisson*. Paris: Masson.
- Amsterdam, B. (1972). Mirror self-image reactions before age two. *Developmental Psychobiology*, 5, 297–305.
- Bahrack, L., Moss, L., & Fadil, C. (1996). Development of visual self-recognition in infancy. *Ecological Psychology*, 8(3), 189–208.
- Bates, E. (1990). Language about me and you: Pronominal reference and the emerging concept of self. In D. Cicchetti & M. Beeghly (Eds.), *The self in transition: Infancy to childhood* (pp. 165–182). Chicago: University of Chicago Press.
- Butterworth & Hicks, 1977.
- Bertenthal, B., & Fisher, K. (1978). Development of self-recognition in the infant. *Developmental Psychology*, 14, 44–50.
- Callaghan, T. C., & Rochat, P. (2003). Traces of the artist: Sensitivity to the role of the artist in children's pictorial reasoning. *British Journal of Developmental Psychology*.
- Carpenter, E. (1975). The tribal terror of self-awareness. In P. Hixins (Ed.), *Principles of Visual Anthropology* (pp. 56–78). The Hague, Netherlands: Mouton.
- DeLoache, J. S. (1991). Symbolic functioning in very young children: Understanding of pictures and models. *Child Development*, 62(4), 736–752.
- Fantz, R. L. (1964). Visual experience in infants: Decreased attention to familiar patterns relative to novel ones. *Science*, 146(12), 668–670.
- Field, T. M., Woodson, R., & Greenberg, R. (1982). Discrimination and imitation of facial expressions by neonates. *Science*, 218, 179–181.
- Jouen, F., & Gapenne, O. (1995). Interactions between the vestibular and visual systems in the neonate. In P. Rochat (Ed.), *The self in infancy: Theory and research* (pp. 277–302). Amsterdam: North-Holland/Elsevier Science.
- Gallup, G. G. (1982). Self-awareness and the emergence of mind in primates. *American Journal of Primatology*, 2, 237–248.
- Gergely, G., & Watson, J. S. (1999). Early social-emotional development: Contingency perception and the social-biofeedback model. In P. Rochat (Ed.), *Early social cognition* (pp. 101–136). Hillsdale: Erlbaum Publishers.
- Goffman, E. (1959). *The Presentation of Self in Everyday Life*. NY: Doubleday.
- Harris, P. (1991). The work of the imagination. In A. Whiten (Ed.), *Natural theories of mind* (pp. 283–304). Oxford: Blackwell.
- James, W. (1890). *Principles of psychology*. New York: Henry Holt.
- Kagan, J. (1984). *The nature of the child*. New York: Basic Books.
- Loveland, K. A. (1986). Discovering the affordances of a reflecting surface. *Developmental Review*, 6, 1–24.
- Lewis, M. (1992). *Shame: The exposed self*. New York: The Free Press.
- Lewis, M., & Brooks-Gunn, J. (1979). *Social cognition and the acquisition self*. New York: Plenum press.
- Meltzoff, A. N., & Moore, M. K. (1977). Imitation of facial and manual gestures by human neonates. *Science*, 198, 75–78.
- Meltzoff, A. N., & Moore, M. K. (1995). A theory of the role of imitation in the emergence of self. In P. Rochat (Ed.), *The self in infancy: Theory and research* (pp. 73–94). Amsterdam: North-Holland, Elsevier Publishers.

- Meltzoff, A. N., & Moore, M. K. (1992). Early imitation within a functional framework: The importance of person identity, movement, and development. *Infant Behavior and Development*, 15(4), 479–505.
- Olson, D., & Cambell, R. (1993). Constructing representations. In C. Pratt & A. F. Garton (Eds.), *Systems of representation in children: Development and use* (pp. 11–26). New York: Wiley.
- Parker, S. T., Mitchell, R. W., & Boccia, M. L. (1994). *Self-awareness in animals and humans*. Cambridge: Cambridge University Press.
- Perner, J. (1991). *Understanding the Representational Mind*. Cambridge, MA: MIT Press.
- Piaget, J. (1962). *Play, dreams and imitation in childhood*. New York: Norton.
- Povinelli, D. J. (1993). Reconstructing the evolution of mind. *American Psychologist*, 48, 493–509.
- Povinelli, D. J. (1995). The unduplicated self. In P. Rochat (Ed.), *The self in infancy: Theory and research* (pp. 161–192). Amsterdam: North-Holland/Elsevier Science.
- Povinelli, D. J. (2001). The self: Elevated in consciousness and extended in time. In C. Moore & K. Lemmon (Eds.), *The self in time: Developmental perspectives* (pp. 75–95). Mahaw, NJ: Lawrence Erlbaum Associates.
- Rochat, P. (1995). Early objectification of the self. In P. Rochat (Ed.), *The self in infancy: Theory and research* (pp. 53–71). Amsterdam: North Holland/Elsevier Science.
- Rochat, P. (1997). Early development of the ecological self. In C. Dent-Read & P. Zukow-Goldring (Eds.), *Evolving Explanations of Development* (pp. 91–122). Washington, DC: American Psychological Association.
- Rochat, P. (1992). Self-sitting and reaching in 5–8 month old infants: The impact of posture and its development on early eye-hand coordination. *Journal of Motor Behavior*, 24(2), 210–220.
- Rochat, P. (2001). *The Infant's World*. Cambridge: Harvard University Press.
- Rochat, P., & Goubet, N. (1995). Development of sitting and reaching in 5- to 6-month-old infants. *Infant Behavior and Development*, 18, 53–68.
- Rochat, P., Goubet, N., & Senders, S. J. (1999). To reach or not to reach? Perception of body effectivities by young infants. *Infant and Child Development*, 8, 129–148.
- Rochat, P., & Hespos, S. J. (1997). Differential rooting response by neonates: evidence for an early sense of self. *Early Development and Parenting*, 6(2), 150.1–150.8.
- Rochat, P., & Striano, T. (1999). Emerging self-exploration by 2 month-old infants. *Developmental Science*, 2(2), 206–218.
- Rochat, P., Querido, J., & Striano, T. (1999). Emerging sensitivity to the timing and structure of protoconversation in early infancy. *Developmental Psychology*, 35(4), 950–957.
- Rochat, P., & Striano, T. (1999b). Social cognitive development in the first year. In P. Rochat (Ed.), *Early social cognition* (pp. 3–34). Mahaw, NJ: Lawrence Erlbaum Associates.
- Rochat, P., & Striano, T. (2001). Perceived self in infancy. *Infant Behavior and Development*, 23, 513–530.
- Rochat, P., & Striano, T. (2002). Who is in the mirror: Self-other discrimination in specular images by 4- and 9-month-old infants. *Child Development*, 73, 35–46.
- Rochat, P. (2001). *The infant's world*. Cambridge: Harvard University Press.
- Rochat, P. (2001b). Social contingency detection and infant development. *Bulletin of the Meininger Clinic*, 347–361, 65. 3. Stern, 1985.
- Striano, T., Tomasello, M., & Rochat, P. (2001). Object and social support for early symbolic play. *Developmental Science*.
- Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard University Press.
- Tomasello, M., Striano, T., & Rochat, P. (1999). Do young children use objects as symbols? *British Journal of Developmental Psychology*, 17(4), 563–584.
- Trevarthen, C. (1979). Communication and cooperation in early infancy: A description of primary intersubjectivity. In M. M. Bullowa (Ed.), *Before speech: The beginning of interpersonal communication* (pp. 321–347). New York: Cambridge University Press.
- Zazzo, R. (1981). Miroir, images, espaces. In P. Mounoud & A. Vinter (Eds.), *La reconnaissance de son image chez l'enfant et l'animal*. Collection Textes de Base en Psychologie. Neuchâtel: Delachaux et Niestlé, pp. 77–110.