

# Theories of Infant Development

Edited by

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# 10

## Emerging Co-Awareness

*Philippe Rochat*

*"The innateness of the longing for relation is apparent even in the earliest and dimmest age."*

Martin Buber

### Introduction

Children first and foremost long for social closeness, affiliation, and recognition. They develop to become increasingly dependent on the judgments and views of others. Secondarily, and possibly in a very illusory manner, they develop to become *Descartes's children*: rational and autonomous beings in a social vacuum, endowed with private insights and awareness, presumably capable of independent judgments and tastes.

An autonomous, socially independent awareness is a myth upheld by many developmental theories, in particular theories on infant behavior and development. The idea of an original adualism from which individual awareness would arise by progressive differentiation was promoted by pioneer psychoanalytical theories (Freud, 1962; Mahler, Pine, & Bergman, 1975), but also by pioneer theories on cognitive development such as Piaget's (1936, 1954).

In this chapter, I discuss the origins of awareness and cognition, in particular the developmental origins of self-awareness, from a radically different perspective, one that gives short shrift to the idea of a differentiated and objective awareness that would

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develop to allow the child to rectify softer and error-prone subjective experiences. I explore the possibility of an inversion of this general rationale that continues to guide most developmental theories, in particular theories on cognitive development. Here I posit that, in fact, from the outset infants develop primarily and foremost a *subjective* outlook on the world, a subjective outlook on the way they relate to others and share experiences with others (i.e., *intersubjectivity*).

Antithetical to the idea of a growing experience of self as a rational entity separated from others and things in the world, I propose here that infants develop primarily a co-awareness of self in relation to others. I will try to illustrate this general idea based on some recent observations suggesting that from the very beginning of psychological life, infants express first and foremost affective passion and irrationality dictated by the inescapable need to be in relation with others. This can amount to the antithesis of reason.

I shall contend here that infants develop in a world inhabited by the gazes of others staring at them. It is an imaginary and ghostly world. As opposed to the physical world, it is a subjective world that is essentially unpredictable and hard to objectify. It is the affective and relational world that develops to become populated with phantasms, fears, and illusions, the world of passion, seduction, selective affinities, love's glories and defeats. This world is not the orderly world of physics. It is the chaotic world of passions we originate from and for which we live, ultimately. From the outset, I assume that it is also against this world that children measure and eventually recognize themselves.

Prior to discussing the developmental origins of co-awareness, it is necessary first to define this concept and demonstrate further how it is opposite to the concept of individual and objective awareness as it is too often construed. Following this preliminary discussion, and on the basis of recent and selected empirical facts, I will present various forms of early co-awareness emerging in succession between birth and 18 months of age. I will conclude with a brief attempt at synthesizing what infancy research tells us about what it means to be self-aware.

### The Myth of Autonomous Awareness and Reality of Co-Awareness

Co-awareness is a neologism which stands literally for being aware or experiencing the world *together* (with others as opposed

to solitary and autonomous). The contrary of co-awareness would be an awareness for itself, the awareness putatively expressed, for example, by Descartes in his philosophical meditations. Even in the case of Descartes's meditations, one can argue that rather than the expression of a solitary and autonomous awareness in process, Descartes's cogitation is actually the expression of a solipsistic form of co-awareness, the expression of internal social dialogue. Accordingly, autonomous and solitary awareness could be a myth, if not an illusion. When, for example, Descartes put forth his famous proposition, "I think, therefore I am," one might ask who emits and who receives the message? Who speaks in Descartes's head? Is it a self-addressed message or is it addressed to a fictive audience? In formulating his ideas in written format for eventual public sharing, it is most probable that Descartes is addressing the fictive audience of future readers. In reality, it is difficult to build a case around the existence of an individualistic, autonomous (i.e., nonsocial) awareness that would exist independently of a social dialogue, whether fictive or real. If such autonomous awareness does exist, it is an exception rather than the rule, for it appears that most conscious mental activities have a dialogical format.

Autonomous/individualistic awareness might indeed be just a myth, one that we hold tight to preserve a sense of identity and social independence, not unlike the adolescent's quest for identity via exaggerated ideological and behavioral demarcation. In reality, it is easy to show that even at our most intimate core, we engage in a constant internal dialogue that orchestrates multiple, often explicitly represented, voices. Even in the form of Descartes's written monologue, conscious thoughts express themselves first and foremost in the form of a social dialogue, whether real or fictitious, as in Dostoevsky's novels where heroes are internally torn by dialogical exchanges between good and evil demons. This kind of "pseudo-" or simulated dialogue could well be the actual foundation of most explicit thoughts and awareness, anchored in the dialogical format of an exchange, whether fictive or real. Accordingly, conscious thoughts would always be co-constructed and individuals always become co-aware, even when absorbed in solitary meditations like Descartes's.

This idea is not new. Thinking as internalized dialogues, problem resolution, concept formation, and other theory-building as processes of virtual dialogues orchestrating multiple voices and perspectives is analogous to what forms the core of Bakhtin's (1981) influential treatment of the evolution of genres in literature history. This idea is also proposed by Cole (1985), Fernyhough

(1996), Vygotsky (1962), and Wertsch (1991); see also Rochat (2001b) regarding cognitive development. Finally, and at a more basic level, Fridlund (1994) discusses the effects of real and fictive audiences on the expression of emotions. Nevertheless, the idea of the social format of high-order thought processes is rarely considered in cognitive sciences. Mainstream cognitive scientists keep construing cognitive processes as separable from a social or dialogical format. This is rather surprising since for most of us it is generally difficult not to engage in overt pseudo-dialogue, without any other listener but ourselves, while trying to resolve daily chores such as putting together a piece of furniture delivered unassembled, operating an electronics component based on a poorly written user manual, or writing a letter of resignation to an abusive supervisor.

This uncontrollable behavior which is public yet for the self, a sort of dialogue in the form of an externalized monologue, is anything but a pathological aberration. On the contrary, it reveals how much mental activity is a dynamic process grounded in social transaction and dialogue. Even at the core of our cognitive intimacy, there is the presence of a virtual other.

If thinking and conceiving rest on the dialectic of a simulated dialogue between multiple voices and perspectives, the product of this dialogue is not an autonomous awareness but, on the contrary, a *co-awareness of the world*, whether this awareness refers to physical, social, or self-knowledge, the latter being the particular focus of this chapter. Note, however, that the exact origins and nature of the internal dialogue remain to be specified. As hinted here, it might constitute a conscious activity itself. Alternatively, it might also be a social overlay to other conscious activities that, in essence, are autonomous. In the latter case, the internal dialogue could be the expression of a habit emerging from our social life. In either case, the dialogical nature and social dimension of cognition is emphasized, both accounts giving credence to the concept of *co-awareness*.

But how does this co-awareness emerge early in life? Infancy research provides facts that allow a better understanding of the nature of co-awareness, in particular what it is made of. But also, it provides a better understanding of how much behavior is determined from the outset by the construal of what others perceive of the self, whether this perception is fictitious or real.

In the remainder of this chapter, I attempt to reconstruct what announces and characterizes the emergence of a co-awareness of the self. Based on selected empirical facts, I propose next a

natural history of early co-awareness, in particular how it emerges between birth and 18 months.

### Bodily (Corporeal) Self of Neonates

First, there is a body. A physical place of sensuality, the meeting place of the environment whether visual, auditory, olfactory, tactile, or multisensory. From birth and probably already in the womb, infants manifest an implicit knowledge of their own body as a differentiated entity among other entities in the world. Evidently, this knowledge is neither explicit nor reflexive, nor is it unique to our species. Individuals of any other mammal or even avian species manifest such knowledge (Cenami-Spada, Aurelli, Verbeek, & DeWaal, 1995). Nevertheless, this knowledge represents the foundational element that human infants develop in unique ways toward an explicit co-awareness that, as we will see below, blossoms by the second year of life. But what exactly is this implicit knowledge of a differentiated body of the newborn, and what are the empirical proofs of its existence from the outset of development?

The bodily or corporeal self of the neonate is perceived, not yet conceptual. Over a century ago, William James (1890) introduced the distinction between the felt "I" and the identified "Me." The "I" for James represents the experimenter of the body, in other words, what is perceived of the body. The "Me" stands for what is recognized and conceptualized about the self in the world, particularly the social world. Following James's distinction, newborns express primarily an "I" as product of the immediate perceptual experience of the body in action as well as the felt fluctuation of internal states. Nonetheless, this perceptual experience of the body by neonates is not the "blooming, buzzing confusion" assumed by James, who lacked the vast amount of empirical data we have today regarding infants and their behavior.

Recent research shows that from the first minutes of life outside the womb, babies manifest a sense of their own body as a differentiated entity among other entities in the environment (see Rochat, 1998, for a more detailed discussion of experimental facts supporting this assertion). According to Neisser (1991, 1995; see also Rochat, 1997), newborns manifest rudiments of a perceived or "ecological" self.

For example, in recent research (Rochat & Hespos, 1997) we showed that from birth infants manifest a discrimination between

tactile stimulation that is self-produced (self-stimulation) and tactile stimulation from a non-self, external origin (allo-stimulation). Comparing the rooting responses of newborns following a stimulation to either the right or left cheek caused by either the finger of an experimenter (allo-stimulation) or the spontaneous transport of the infant's own hand toward the face (self-stimulation), we observed that newborns tend to turn their head and root more toward the experimenter's finger compared to their own hand.

It appears that infants from birth are capable of discriminating information that specifies the own body as a differentiated entity. This observation is not trivial since it is contrary to the long-held idea of an initial state of undifferentiation or confusion between infants and their environment (e.g., Piaget, 1936). Some psychoanalysts went as far as elaborating theories of personality development on the premise that the starting point of such development is an initial state of undifferentiation or "infantile autism" (Mahler et al., 1975).

Recent research indicates that, on the contrary, early on infants process intermodal (polysensory) information that specifies the body as a distinct entity. Researchers have now accumulated numerous data demonstrating the remarkable coordination at birth of visual and postural/vestibular systems. Such coordination allows infants to pick up information that specifies movements of the own body in a stable environment or the reverse, the stability of the body in a moving environment (Bertenthal & Rose, 1995; Butterworth, 1995; Jouen & Gapenne, 1995). Such discrimination, which is based on the processing of perceptual information from multiple modalities, is evident from birth and probably the result of an active prenatal calibration of sensory and motor systems. Fine ultrasonic scanning of fetuses during the last 3 months of pregnancy reveals indeed that most of the behaviors observed immediately after birth in newborns are already functional and well established in the womb (DeVries, Visser, & Prechtel, 1984; Hopkins & Prechtel, 1984).

There is a remarkable continuity between pre- and postnatal behaviors (Prechtel, 1984). This continuity suggests that the implicit knowledge of the body as a differentiated entity expressed in newborns' behavior could well be the product of prenatal learning. This idea is not farfetched. Prenatal learning is now well established in relation to maternal voice discrimination in newborns (DeCasper & Fifer, 1980; DeCasper, LeCanuet, Busnell, et al., 1994), and in relation to olfactory discrimination. Based on prenatal experience, newborns are shown to discriminate within minutes after birth the amniotic fluid of their mother compared

to the amniotic fluid of a female stranger (Marlier, Schaal, & Soussignan, 1998).

The perceptual learning of the own body as differentiated from other entities in the world is the main pillar of an ecological sense of self expressed by infants from birth. Although far from a conception of the self as perceived by others, this basic sense of self is a necessary precursor, a *sine qua non* condition for the emergence of co-awareness. Questions remain, however, as to how infants develop co-awareness from this basic, early (perceived) sense of self.

Next, I propose that a marked progress toward co-awareness occurs at around 2 months of age, when infants not only express a sense of their own body as differentiated, but also begin their lover's career as active *seducers* in the context of reciprocal emotional exchanges with others.

### First Explicit Reciprocity at 2 Months

Considering the remarkable continuity between pre- and postnatal behavior, the physical separation of the child from her mother at birth, as dramatic and intense as it might be, is certainly a major event from a biological standpoint, but probably not from a psychological one. Nothing demonstrates that a psychological birth accompanies the physical birth of the infant. There is no clear evidence of a new psychology emerging with the child leaving the maternal womb, no apparent qualitative behavioral step forward. In sharp contrast, we observe by the second month following birth the first clear evidence of a new emerging psychology, a genuine behavioral step forward. This step is indexed by the emergence of socially elicited smiling, a behavior by which parents typically begin to recognize a person in their infant. This is commonly revealed by baby diaries as well as by traditions and beliefs in certain cultures. For example, natives from Tahiti in the South Pacific reportedly do not grieve an infant's death before he or she has shown signs of smiling and affective reciprocity by the second month. Tahitians begin to mourn the loss of infants once they have smiled, not before (Levy, 1973, p. 437).

One can observe a radical behavioral reorganization with the appearance of the social smile at around 6 weeks of age. This reorganization corresponds to a revolution in the way infants relate to the world, in particular how they relate to others via reciprocal exchanges. This revolution is *de facto* the true psychological birth of the infant, the beginning of a sense of shared

experience with others, hence the beginning of co-awareness (Rochat, 2001a).

For parents, witnessing the first smile of their child in the context of intimate face-to-face exchanges (as opposed to the automatic smile expressed by neonates during sleep or following feeding) is a major event. Nothing can exaggerate the importance of the emergence of socially elicited smiling in the life of a child and his caretakers. This emergence marks the beginning of the child's relational existence as it is the first explicit manifestation of a shared positive experience. It is the first unmistakable manifestation of an experience of well-being with others. It is also the first message of reciprocity that is not only linked to basic physical cares dispensed by the adult. It is the first message that begins a lifelong conversation with others. With socially oriented smiling, infants affirm their presence in the world *with* others. It is the beginning of co-awareness, and indeed the true psychological birth of the child.

Parallel to the emergence of social smiling, many other aspects of infants' behavior are reorganized. For example, during the second month the capacity of infants' attention changes markedly and in a relatively sudden fashion. Wolff (1987) observes that by 6 weeks infants spend significantly more time in an awake and alert state, spending significantly more time attending to their environment with eyes wide open. It is also by this age that infants begin to scan faces by focusing markedly more on the eyes and the mouth, facial regions that are rich in information regarding the fluctuating emotional states of others. In sharp contrast, neonates tend to focus much more on the periphery of the head (Haith, Bergman, & Moore, 1977; Maurer & Salapatek, 1976; see also the relevant work of Morton & Johnson, 1991). Note, however, that internal features are not merely overlooked by neonates, since they are capable of facial imitation such as tongue protrusion (Meltzoff & Moore, 1977). Note also that because infants are born with low visual acuity, visual fixations in newborns might not correspond to actual processing of information.

At the level of general cognitive development, the second month marks a change in the stance the infants take toward the world that surrounds them. There is some kind of a radical worldview change. From birth, and even prior, infants are capable of complex sensorimotor learning and perceptual discrimination. However, this learning and discrimination do not appear yet to be under anything that resembles voluntary control, still dependent on the here and now or immediacy of perceptual experiences. There is not yet clear evidence of systematic groping or exploration. For

example, numerous studies done in the past 30 years demonstrate the stunning capacity of neonates to imitate facial expressions such as mouth opening, tongue protrusion, and even emotional facial displays such as happy or sad expressions (Field, Woodson, Greenberg, & Cohen, 1982; Meltzoff & Moore, 1977). However, this imitation is still rather fragile. It is not very systematic and does not show much flexibility. This led some critics to view neonatal imitation as nothing more than the product of innate automatic release mechanisms (Anisfeld, 1991). By 6 weeks, infants' imitative behavior eludes such interpretation, clearly demonstrating that there is more to it than a prewired automatism. Meltzoff and Moore (1992) showed that by this age infants begin to systematically modify their imitative response to match the adult model. For example, if the experimenter pulls his tongue to the side, the infant might first pull her tongue to the center and slowly bring it to the side to match the target gesture. This behavior shows systematic approximation and what amounts to willful groping.

Recently, we made similar observations comparing newborn and 2-month-olds' sucking behavior on "musical" rubber nipples. In this research (Rochat & Striano, 1999b), every pressure applied by the infant on the nipple was associated with a contingent succession of sounds that were more or less the auditory analogue of the oral pressures generated by the infant on the pacifier. In one condition (analogue), the pitch variation of the successive sounds heard by the infant was proportional to the variations of pressures applied by the infant on the pacifier. In another (nonanalogue) condition, the pitch variation of the sounds was not, varying randomly. We observed that by 2 months, infants manifest a differential modulation of their suction of the pacifier depending on the condition (i.e., analogue or nonanalogue auditory consequence of sucking). In contrast, we tested newborns who did not show any evidence of such differential responding, hence no evidence of systematic exploration of the auditory consequences of their own oral (sucking) activities.

Around 6 weeks of age, babies thus manifest a novel stance toward objects, toward themselves, and toward others. This novel stance is a *contemplative and reciprocal stance*, as opposed to the discriminatory and immediate stance of newborns (Rochat, 2001a,b). This new stance is linked to expectations and the systematic exploration of physical events, as well as to the first reciprocal exchanges with others. Affective reciprocity by the second month is a major step toward co-awareness and, I propose, the second *sine qua non* condition of its development. As discussed

earlier, it adds to the sense of a differentiated self expressed by infants from birth that was the first *sine qua non* condition for the emergence of co-awareness. We will see now that in adopting a contemplative stance, and in particular by monitoring reciprocal exchanges with others, infants gain access to self-objectification. They have the opportunity to project themselves in others, with the help of others.

### Self-Ejection and the Social Mirror

When by the second month infants begin to manifest an emotional reciprocity with others via smiling and gazing, it is as if they are literally drawn out into what can be called the "social mirror." Parents and caretakers who are finally gratified in their communicative efforts begin to interact with renewed, more frequent, and more protracted presentations of their own face to the infant. In addition, in the course of these facial presentations, the adult is typically compelled to cause infants to smile, or even better, to cause them to burst into laughter by *imitating* and *exaggerating* their facial expressions. In fact, in these first emotional conversations, adults' behavior is typically a running commentary of the actions and of the fluctuating emotional states of the infant. If the infant starts to cry, for example, the mother or any other caretaker will manifest her empathy by adopting a low and sad-sounding voice. On the contrary, if the infant expresses joy and pleasure, the caretaker's voice will typically follow through with higher pitch and joyful tonality contours.

This highly reliable phenomenon of compulsive emotional resonance of the adult toward the infant is striking and possibly unique to our species, regardless of cultural and familial contexts. Certainly, this phenomenon is prominent in western middle-class culture and observable with some variability anywhere in the world. It corresponds to what Gergely and Watson (1999) coined as *affective mirroring* or Stern (1985) described as *affective attunement*.

At the beginning and from the emergence of the social smile, affective mirroring is highly asymmetrical, the adult initiating exchanges while tracking the emotional states of the infant. Affective mirroring, although a bidirectional process, is first heavily weighted by the adult. Metaphorically speaking, the adult caretaker orients a mirror that is *magnifying* back to the infant an image of emotional expressions that are greatly exaggerated.

The question remains, however, as to what might be gained by both infants and caretakers in such a mirroring game. This question



is important considering that such reciprocal, face-to-face interaction might be specific to humans and their close relatives, particularly chimpanzees. It is feasible that the process of affective mirroring is a central feature of primate evolution, a fundamental mechanism evolved by humans that could be at the origin of greater potentials for empathy and other prosocial behavior.

Aside from the communicative and proximity maintenance (intimacy) function served by affective mirroring, from a cognitive standpoint I would like to propose that this primitive form of communicative exchange first initiated by caretakers allows infants to distance or *eject from themselves*, a process necessary for co-awareness. The term ejection is borrowed from Baldwin (1925), who coined it to qualify the process by which children start to project themselves into others and become capable of adopting others' views on things, including what they perceive and construe about themselves.

Gergely and Watson (1999), in their discussion of the putative mechanisms underlying affective mirroring, suggest that the exaggerated online affective responses by the adult serve to mark them as a reflecting (mirroring) commentary, in contrast to any other commentaries. In other words, the adult highlights or puts in "quotes" via amplification and exaggeration the emotions that match those expressed by the infant. This highlighting would allow the infant to differentiate between emotions and emotional narratives that are reflecting of the self and those that are not geared toward any kind of mirroring of the infant. This process, instinctively and compulsively initiated by the adult, would be a privileged way to guide the infant toward an objectification of the self. Accordingly, in observing others interacting with them, infants have the opportunity to see themselves in a magnifying mirror. They would see themselves based on an ability to detect the contingency between the proprioception of their own facial movements and the synchronous vision of the social partner's facial expressions. The same contingency detection would apply to vocal exchanges. Note that such contingency detection ability is well established from at least 3 months of age (Bahrick & Watson, 1985; Watson, 1995). To the extent that co-awareness implies some projection of the self into others, we can appreciate the potential role played by adults' affective mirroring in its emergence.

With the onset of social smiling, infants are literally drawn into the affective mirror presented by others. The joy associated with face-to-face exchanges rests on the sharing of moments of emotional harmony, the protagonists tuned into the same affective key, experiencing similar feelings not unlike grown-ups engaged in the pleasure of gossiping or sharing a good meal. In

all instances, the goal is to ascertain closeness and affective fusion with others. With the first socially elicited smile, this process is made possible, each protagonist given the means to recognize himself or herself in the other.

Self-ejection and the perception of self in the behaviors of interacting others form another major step in the development of co-awareness: the third *sine qua non* condition of its development. This condition is the product of active scaffolding on the part of infants' caretakers via an instinctive and universal propensity toward affective mirroring. This propensity is provoked by the first signs of a contemplative and reciprocal (smiling) stance detected by the parent or caretaker in the infant. The putative importance of such a process in personality development is evidenced by research showing that young infants of depressed mothers who are typically more placid and less engaged in affective mirroring also show less social engagement when compared to infants of nondepressed mothers (e.g., Field, Healy, Goldstein, & Perry, 1988).

Recent progress in cognitive neuroscience research brings new empirical facts that indirectly validate the importance of social mirroring as a determinant of co-awareness. It appears that underlying the reciprocal imitation of behavior characterizing affective mirroring, there is a vicarious experience process that is deeply anchored at more molecular levels of brain functioning. For example, the existence of mirror neurons have been demonstrated in the cortex of monkeys. These neurons fire when a particular motor action is produced by the monkey, grasping an object for example. Interestingly, these neurons appear to also fire when the monkey sees the same action produced by a conspecific (Rizzolati, Fadiga, Gallese, & Fogassi, 1996). In other words, even in relation to brain organization, mechanisms exist that support an equivalence of performance between performing an action and seeing this action performed by others. This suggests that brain mechanisms are in place to support affective reciprocity via vicarious experience (see also Preston & DeWaal, 2002). Yet, it is not clear whether these brain mechanisms are innate or the product of experience. At the macroscopic level of behavior and in relation to infants, adults instinctively promote reciprocity via active social mirroring. The process itself is triggered by infants taking a contemplative and reciprocal stance at around 2 months.

### Development in the Social Mirror

In the context of mirroring and other face-to-face exchanges between infants and their caretakers, routines, rituals, and other

invariant forms of protoconversation arise in which both protagonists can perceive themselves. It is in this context that babies discover their "interpersonal self," as Neisser (1991) calls it. The interpersonal sense of self of infants emerges in the invariance and the expectation of certain patterns of dynamic social exchanges. As presented earlier, others reflect with amplification what the infant expresses publicly (smiles or whines) as well as what the infant might feel privately (joy or displeasure). This social mirror allows infants to objectify themselves by projecting out of the private sphere onto the screen or sounding board offered by the adult. This self-ejection is a kind of deincarnation constrained by the compulsive affective mirroring promulgated by caretakers.

Infants quickly learn to perceive themselves in others, developing a sense of their interpersonal self as specified by affective mirrors. Between 2 and 6 months, infants develop social expectations that index a developing sensitivity to what adults reflect back to them. For example, if the adult suddenly interrupts her affective mirroring by adopting a sudden still face while continuing to stare at the infant, he tends to show clear signs of distress including gaze avoidance, self-comforting behavior, frowning, and sometimes even crying (Rochat, Neisser, & Marian, 1998; Toda & Fogel, 1993; Tronick, Als, Adamson, Wise, & Brazelton, 1978).

In a recent study (Rochat, Querido, & Striano, 1999), we found that 2-month-old infants are as positively engaged toward an adult playing a peekaboo game, whether this game had a clear pattern and kept occurring at regular intervals or was scrambled and disorganized in its occurrence. At this age, the mere presence of an attentive adult is enough to engage the infant positively. In sharp contrast, by 4 and 6 months, infants begin to show differential engagement (more or less sustained gazing and smiling toward the adult) depending on whether the peekaboo game orchestrated by the adult is organized or disorganized, hence predictable or not.

It is interesting to note that, parallel to the development of such social expectancies between 2 and 6 months, infants develop a great infatuation for physical objects that they start to reach and grasp for systematically (e.g., Rochat, 1989). This new infatuation makes face-to-face protoconversations more furtive and adults have typically a harder time capturing the infant's attention. The infant is increasingly distracted by all that is offered by the physical environment in terms of actions and discoveries. However, the strong social and affective demand of infants is not diminishing. Therefore, they develop novel strategies to capture

others' attention toward the self while continuing their irresistible foray into the object world.

In general, we observe that the inertia of gazing toward others, namely, the duration of eye-to-eye contacts once established, diminishes markedly and steadily between 2 and 6 months of age (Rochat, Striano, & Blatt, 2002). This probably reflects the developing information-processing and memory power of the infant. These cognitive gains allow novel allocations of attention that can focus more equally on people and physical objects (Ruff & Rothbart, 1996). It is in this general context that expectation about others and representation of others in relation to the self are developing. It is also in this general context that a new triangulation linking the infant, others, and the surrounding physical world of objects arises. From this triangulation originates also the development of symbolic communication, in particular the use of more or less arbitrary conventional signs to communicate with others in reference to things and events in the world (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Bruner, 1983; Tomasello, 1999).

The processes leading infants eventually to function symbolically remain probably the most controversial topic of developmental psychology and many divergent theories have been proposed, from strong nativist views (e.g., Pinker, 1994) to more functionalist and neo-Vygotskian views (e.g., Bruner, 1983; Tomasello, 1999). Here, my modest foray into this controversial issue will be to suggest that the divided attention toward others and objects expressed by the infant starting at 4 to 6 months of age is an important factor in the emergence of co-awareness. We will see next that to combine the pull toward physical objects and the continuing need to maintain proximity with others, infants are constrained to integrate both attention pulls via co-awareness. It is from this point on that infants begin to have others constantly in mind, even when others are absent. This trait will shape the psychology of the child for life.

### The 9-month-old's Dilemma and Origins of Social Referencing

How do infants come to solve the dilemma of maintaining proximity with others while discovering the expanse of their physical environment? It appears that they solve it by *integrating others* in their exploration of objects and their foray of larger regions of the physical environment. Accordingly, by 9 months and with



the onset of locomotion, infants become jointly attentive to objects and events in the world, in other words, attentive *with* others. If an infant plays with an object, she will start to check with quick back-and-forth glances between the object and the social partner, actively monitoring whether they are both interested in the same thing. These signs of joint attention announce the referential and symbolic communication by gestures or by words that blossoms by the second year (Bates et al., 1979; Bruner, 1983; Tomasello, 1995; Tomasello & Farrar, 1986). The integration of others' attention in the exploration of objects by the infant is probably an important factor in the emergence of social referencing, the infant actively attempting to incorporate others' looks and attention in what she is doing for herself. On one hand, the infant begins to lose her independence by becoming increasingly preoccupied by others' attention toward her and her actions. On the other hand, the infant gains control of others, in particular of their proximity, without compromising the infatuation with object exploration that they had no problem expressing on their own at an earlier age.

We will see next that by the end of the first year or the beginning of the second, the drive to control the proximity of others becomes a priority for the child. By 18 months, infants typically have a harder time entertaining themselves on their own with toys or other physical objects for long periods of time. They quickly search for caretakers' assistance and attention. At a later age, children will eventually tend to organize their exploration and play with physical objects sometimes in a recreated or virtual social context in the form of imaginary dialogues and other symbolic plays (Tomasello, Striano, & Rochat, 1999; Striano, Tomasello, & Rochat, 2001).

It is interesting to note that with the emergence of social referencing and attempts at capturing and monitoring others' attention, there is a corresponding emergence of novel overt anxiety: anxiety over separation from familiar figures and the uncontrollable fear of strangers (so-called *eighth-month anxiety*, according to Spitz, 1965). This developmental coincidence is not fortuitous. It is another expression of the 9-month-old's dilemma between novelty exploration and intimacy maintenance with close ones. If from now on the exploration of novelty and its experience needs to be shared, it cannot however be shared with anyone. It is as if infants at this developmental juncture always need to be reassured by the exclusive presence of those individuals who can share experience with them. As I will suggest in the conclusion, the fear of rejection is indeed the mother of all anxieties.

If the fear of rejection and affective exclusivity is exacerbated by 9 months, this is accompanied by new cognitive strategies to use others as informational resources about the states of things and of the environment, such as dangers and other potential risks. Accordingly, by 9 months infants begin to refer feelings of joy, attractions, or fears to the feelings of others. For example, they begin to systematically monitor the facial expressions of others to disambiguate a novel situation, such as the sudden barking of a mechanical dog (Striano & Rochat, 1999), or when crawling toward the edge of a high platform that could lead to a harmful fall (i.e., the visual cliff experiment; see Campos, Anderson, Barbu-Roth, Hubbard, Hertenstein, & Witherington, 2000, for a review). It is indeed at around 9 months that infants begin to monitor the facial expressions of others, referring to them as the emotional theater that reflects not only the resources of the environment, but also its threats and other potential dangers.

By integrating the gazing of others in their foray of the environment, infants manifest at a cognitive level the first signs of a quest for instructions from others. But more importantly, at an affective level, this new development marks the beginnings of a quest for *social approbation*. This quest is probably the core motif of psychology in general, and not only of human psychology (see, for example, DeWaal, 2001). It is the core motif of children when they begin to talk and function symbolically. It is the core motif of the psychology of adolescents in their (often paradoxical) pursuit of a social identity. It is also the core motif of any individual in his or her adult choices.

### Charm, Seduction, and the Growth of Irrationality

The reference to others' view starts a process that rapidly becomes a major determinant of infants' and toddlers' behavior. It leads the child toward a growing awareness of the self in relation to others. At the level of behavior, the emergence of this novel (self-conscious) awareness manifests itself most blatantly in the form of a proactive and systematic enterprise of seduction, leading the child to behave in increasingly irrational and phantasmal ways. It is the dawn of the complex system of representations that children generate as to how they relate to others, how they are perceived and ultimately valued by them. These representations range from the longed sense of being loved and affiliated to the most dreaded sense of being rejected and disenfranchised.

The elaboration of these representations brings the social dependence of the young child to new, much more complex levels of meaning. These new levels of meaning are indexed by the blossoming of behaviors that defy reason and common sense. These include coy behavior, embarrassment, excessive and defiant behavior, irrational fears and anxieties in pretend plays as well as in the form of nightmares during sleep.

At the level of exchanges with others, this psychological "revolution" also translates into the emergence of a whole range of proactive behaviors driven by the irresistible need to maintain affective proximity with others. This marks the beginning of young children's active and selective seduction of the people they encounter, rather than the reverse (adults actively seducing infants), which up to this stage has dominated their life. As we know, games of seduction often defy reason! It is in this sense that parallel to the progress in logic and the rational conception of the physical world as described by Piaget and followers, by the second year children develop also, and probably more decisively, a capacity for seduction that leads them to irrationality. This development pertains to a world that is essentially subjective and phantasmal: it is the represented world regarding how others perceive, value, and eventually judge our selves.

Beyond their first birthday, infants manifest a dependence toward others that more and more defies common sense and straight understanding. When their child begins to walk and even to run, it is common for parents to notice how toddlers seem systematically attracted by the most dangerous obstacles in the environment: stairs, roads, stoves, and other threatening features. These kinds of behavior quickly become means by which infants express defiance and gain renewed attention from the caretakers by controlling their panic intervention. Under the threat of defiant behaviors, parents are coerced into the undivided attention and exclusivity the infant is longing for.

Undivided attention of others on the self is indeed the ultimate expression of closeness and affective fusion that the young child is now actively seeking in others. Defiant behaviors mark the beginning of active seduction as a process of appropriation of others, in particular the appropriation of their undivided love and attention. In this process, children begin actively and systematically to coerce others into co-awareness. Note that this process is not unlike caretakers' drive at coercing younger infants' attention and positive emotions in silly games in an attempt to create a sense of shared experience.

To illustrate and give some empirical ground to this developmental account, I report below three observations that point to the beginning of active seduction at around the first birthday. In an investigation of the developmental origins of instructional learning, we recently studied the impact of the presence and interventions of others in a problem-solving situation with various levels of difficulty (Goubet, Leblond, Poss, & Rochat, 2001; Rochat, Goubet et al., 2002). We systematically observed infants aged between 9 and 18 months presented with an attractive toy placed at a distance on a blanket in front of them. Infants sat on their mother's lap and an experimenter sat to the right of the infant. To grasp the toy, the infant had first to pull the blanket toward her to bring it within reach, a classic Piagetian means-end task that is solved at around 8 months (Piaget, 1936; Frye, 1991).

Our observations confirm that the great majority of 9-month-olds manage with no hesitation to pull the blanket and bring the toy toward them for further exploration and play. Curiously and rather unexpectedly, we found that this simple means-end performance tends to *deteriorate* by 14 and 18 months! At these older ages, about half of the infants do not try to pull the blanket. Rather, they desperately try to reach directly toward the distal toy by stretching and whining while looking at the experimenter. They request help and do not even seem to consider that they could manage to get to the object on their own. This behavior defies reason and does not reflect what infants at this age and following Piaget's account are clearly capable of doing in terms of means-end coordination. In fact, it appears that the physical meaning of a simple means-end task is now transformed into a more complex social and relational problem. It is as if others rather than the toy are becoming the game's end. The infant seems to construe the task as an opportunity to gain proximity with and the undivided attention of others. The goal of the child is to commune and ascertain closeness with others, not to get to the toy. By the middle of the second year, the toy becomes a means to a social end, the end of creating co-awareness.

Another example indexing the emergence of an active process of seduction by the second year is illustrated with another observation we made with infants aged 9, 11, 14, and 18 months. Infants were facing an experimenter who systematically imitated the kind of actions they spontaneously performed on a toy (Agnetta & Rochat, 2003; see also the original study reported by Meltzoff, 1990). By 11 months, but particularly by 18 months, infants begin systematically to test the imitation of the experimenter by accelerating or suddenly stopping their own actions

while staring at the experimenter and sometimes smiling at her. With this subtle mutual imitation game, infants attempt to ascertain control of the experimenter's behavior by probing imitative responses. Again, with these actions, infants convey a sense of co-awareness. They play on the same key with the experimenter, equally engaged in trying to be the imitator rather than the imitated. With this kind of development, infants reach new, more reciprocal levels of affective fusion and complicity with others.

Finally, further clear evidence of a major step toward co-awareness is the emergence of embarrassment at around 18 months of age. Already from 2 to 3 months, infants demonstrate behaviors that look like embarrassment (i.e., smile accompanied by gaze aversion) while, for example, encountering an unfamiliar person (Reddy, 2000). However, it is by 14 months that infants begin to manifest social embarrassment in a predictable and marked way, not only in the context of protracted attention on the self by others, but also in the context of a task or performance that can be evaluated by others.

By 18 months the young child begins to manifest explicitly that he can recognize himself in a mirror, trying, for example, to wipe a spot of rouge that has been surreptitiously put on his face and that he discovers in the mirror (Gallup, 1971; Lewis & Brooks-Gunn, 1979; Zazzo, 1981). Interestingly, aside from explicit self-recognition as in the rouge task, some infants by the second year also manifest embarrassment in front of their own specular image. This behavioral manifestation is very complex and even paradoxical, from the hiding of the face with arms and hands, gaze aversion, or sudden acting out in an apparent attempt to distract from what is revealed in the mirror (Fontaine, 1992). The emergence of these behaviors is linked to the development of co-awareness, in particular the awareness of others' view on the self. With embarrassment, children indicate that what they perceive in the mirror is not only an image that refers to themselves (the identified and conceptual "Me" according to William James), but also what others can see of the self (in other words, the "public and potentially evaluated Me").

The development of self-awareness opens the door to the development of self-presentation based on the very complex and often highly irrational process of representing how others perceive and evaluate our selves. This process certainly contributes to the development each individual constructs according to his or her circumstances of a sense of moral conduct (i.e., sense of what behavior is socially more or less acceptable) and of a sense of affiliation (i.e., sense of being more or less accepted by others).

It is also on the basis of this process that children learn to collaborate with others and are able to engage in a didactic (i.e., explicitly instructional) relationship, either as teacher or student, all of which rests on co-awareness. More importantly, it is on the basis of this process that children begin their career as compulsive seducers, exploring and exploiting for better or for worse the affective resources of their social environment, endlessly foraging for intimacy, proximity, and group affiliation.

### Conclusion: The Biological Roots of Co-Awareness

In this chapter, I attempted to show that individual awareness is a myth that needs to be replaced by the reality of co-awareness, an awareness that is dialogical and shared with others. Instead of an individualistic phenomenon, I proposed that awareness is first and foremost a social construction that is negotiated with others, not a rational (Cartesian) and individual phenomenon as it has been too often assumed by developmental psychologists and other cognitive scientists. We have seen that the construction of co-awareness is a long process that starts very early on in development, at least by 2 months with the emergence of the social smile.

An inescapable fact that any psychological theory should be built on is the fact that individuals live and develop *for* and *through* others. They do not develop in isolation as compartmentalized minds. This fact dictates the primary drive of individuals to attach and identify themselves to others, to maintain maximal physical proximity and psychological intimacy with others. Intimate fusion with others is the primary force that drives the mind, whether human or not (e.g., Dunbar, 1997). It appears that cultural and social learning, as observed in humans, great apes, and other mammals, always seems to boil down to the same basic need for conformity: the primary and urgent need to be *affiliated*, to belong and fuse with the life of others, from the mother to siblings, and eventually the larger group of conspecifics.

Primatologist Frans DeWaal (2001) recently proposed that in animals, including humans, the psychological development of the individual rests on a basic phenomenon combining attachment and learning by identification with others (what he calls "bonding and identification-based observational learning," or "BOIL"). According to DeWaal, this learning mechanism rests on the primary desire of the individual to conform to others. We might add that, conversely, what drives this mechanism is the

fundamental fear of separation and isolation that is the mother of all anxieties.

Early on, in both ontogeny and phylogeny, behaviors seem to be dictated by the fear and the avoidance at all costs of social alienation (i.e., indifference and hostility of others, hence social isolation). Separation, rejection, abandonment, and estrangement from others form the supreme psychological threat to all individuals at all ages, and it seems across most mammalian species. The internalizing of this ultimate psychological threat as determinant of animal behavior is in all probability anchored in biological evolution, linked to the necessities of survival and the product of millions of years of natural selection (see, for example, the biological theory of infants' and children's attachment proposed by Bowlby). The supreme threat of separation and the primary urge for affiliation are probably well ingrained in the biological machinery from the outset, having a different expression as a function of age and of the sociocultural idiosyncrasies of each individual's environment.

I have tried to show here that from at least the second month of life, nurtured by caretakers' compulsive empathy toward them, infants' psychological development is shaped around the innate drive to promote *fusion and intimacy with others* via active seduction as the antidote to separation. It is in this primordial context that human and possibly other animals' awareness develops. This awareness is first social and shared, anchored in the need for fusion, affiliation, and sharing with others.

We should never overlook the fact that intelligence and reason are primarily working toward the quest and maintenance of intimacy which, paradoxically, more often than not, manifests itself in irrational ways, including uncontrollable passions, jealousy, and acts of seduction. It is this quest that unifies us as individuals and gives sense to our lives. What vary greatly and need to be further investigated are the levels of its expression across ages, cultures, and animal species.

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