Becoming *Homo Aestheticus*: Sources of Aesthetic Imagination in Mother-Infant Interactions

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Along with the vital abilities to cry and to suckle, human neonates are born with remarkable capacities that predispose them for social interaction with others. For example, newborns prefer human faces and human voices to any other sight or sound (Johnson et al. 1991, 11). They can imitate face, mouth, and hand movements and respond appropriately to another person's emotional expressions of sadness, fear, and surprise. It is perhaps less well known that at birth, infants can also estimate and anticipate intervals of time and temporal sequences (DeCasper and Carstens 1980). They can remember these temporal patterns and categorize them in both time and space, and in terms of affect and arousal (Beebe, Lachman and Jaffe 1997). By six weeks of age, these innate perceptual and cognitive abilities permit normal infants to engage in complex communicative interchanges with adult partners—the playful behavior that is commonly or colloquially called "babytalk."

In this paper I propose that pretense—the basis for aesthetic imagination and other forms of "decoupled cognition"—arises from (and is first developed in) the sensitivities to the signals and timing of this normal and ordinary activity that every infant and mother are predisposed to perform. As conceptualized at the conference for which this paper was prepared, decoupled cognition includes dreams, pretense, play, mental state attribution ("theory of mind"), language, and art (Steen, *personal communication*). It is considered to require evolutionary and cognitive explanation because such activities do not concern or map "reality." However, in this paper I show that pretense is inherent in the way the human mind was evolved to work —in emotional relationship with others—and, as such, is neither an evolutionary nor a cognitive problem.

"Babytalk"[1]

Babytalk is a multimedia performance. It contains not only "talk" (or the characteristic undulant, high-pitched, patterned, repetitive vocalizations with pauses called "motherese," "parentese," or "infant-directed speech"). Accompanying the utterances are peculiarly stereotyped, repetitive, and exaggerated facial expressions, head movements, and gestures, described in greater detail below. Infants respond to these with their own vocal sounds and face and body movements and, in many societies, sustained mutual gaze.

Babytalk is not only a multimedia performance, but a multimedia *duet* that incorporates both synchrony of behavior and alternation (or turntaking) —activities that are made possible by the infant's inborn sensitivity to temporal sequence and pattern. It is often said that adults exaggerate and repeat the facial expressions and sounds of babytalk in order to attract and hold the infant's attention. But emphasizing the adult's provision of such signals obscures infants' critical role in the interaction. Because infants let us know by their own positive and negative reactions which movements, expressions, and sounds they prefer, they can be said to actively elicit, shape, and otherwise influence the pace, intensity, and variety of signals that we present to them.

In babytalk, then, mothers or caretakers subtly adjust rhythmically patterned and dynamically varied visual, vocal, and gestural behaviors to the infant's own changing visual, vocal, and gestural expressions of emotional state. Microanalyses of videotaped interactions (at 24 frames/second) show exquisitely conjoined engagements, with signals, responses, and anticipations of responses that occur too rapidly for conscious processing—they take place in what Daniel Stern (1971) has called "a split-second world."

Ingenious experiments have presented *de*-synchronized signals to mother and infant, and have demonstrated graphically that by at least eight weeks of age, a baby detects whether its partner is acting contingently or not and responds accordingly (Murray and Trevarthen 1985; Nadel 1996). In these experiments, each member of the pair is in a separate room and responds to the partner's face and voice as presented on a video monitor, a modification that does not alter their interactivity. A second video camera with voice recorder is used at the same time and, after two or three minutes, the tape is rewound to an earlier point and smoothly substituted for the ongoing interaction on the monitor of one or the other of the pair. The deceived partner does not realize that she (or he) is now viewing expressions,

sounds, and movements that had been responded to in real time some seconds earlier. When a baby is shown a "non-contingent mother," its own facial expressions and body movements show confusion and distress as it senses the mother's misattunement and cannot regain engagement. For her part, a mother tries vainly to re-engage her de-synchronized infant and might tell the experimenter "I can't understand what's wrong! He [she] doesn't seem to like me anymore." Such experiments underscore the crucial importance to an infant of interactivity and contingent responsiveness, not simply the mother's production of signals.

Developmental psychologists, neurologists, and other investigators find early interactions, or their components, to be critical to an infant's later emotional, intellectual, psychosocial, and linguistic functioning. A significant positive correlation has been demonstrated between infant growth and the mother's use of infant-directed speech (Monnot 1999). Additionally, maternal vocalizations direct and modulate the infant's state or level of attention and arousal (Fernald 1992) and provide acquaintance with the prosodic (or expressive) features of language by which information is gained about others' sex, age, mood, and probable intentions (Fernald 1992, Locke 1996). Participation in early interactions aids an infant's homeostatic equilibrium (Hofer 1987) and biobehavioral self-regulation (Beebe and Lachman 1994; Spangler et al. 1994); develops cognitive ("narrative") abilities for recognizing agency, object, goal, and instrumentality (Stern 1995); predisposes the infant generally to intellectual and social competence, including recognizing intentionality, engaging in reciprocity, and developing expansion (recall and prediction) beyond the present situation (Hundeide 1991). Psychotherapists describe how babytalk facilitates synchronization and attunement of mother and infant (Stern et al. 1985, Beebe 1986) and reinforces neural structures predisposed for eventual socioemotional functioning and enculturation (e.g., Main, Kaplan and Cassidy 1985; Schore 1994; Trevarthen and Aitken 1995; Jaffe et al., *in prep*). Psycholinguists and other researchers point to the contribution of mother-infant interactions to eventual language learning—i.e., the baby is pre-adapted for eventual speech, and the reinforcements of babytalk move the infant along that path (e.g., Snow 1977; Parker 1985; Locke 1993; Papoušek and Papoušek 1997).

Studies of early interactions by evolutionarily-oriented thinkers have primarily examined the adaptive function of infant-directed *speech* (e.g., Fernald 1992; Monnot 1999), or infant *attachment* (e.g., Bowlby 1969, Freedman and Gorman 1993, Chisholm 1996). Daly and Wilson (1995, 1273) point out that a newborn's precocious social response may be an adaptation

for "advertising quality and eliciting maternal commitment." However, none of these theorists has specifically addressed the implications for evolutionary psychology of mother-infant engagement as an evolved, *interactive, mutually-influenced* (or dyadic) behavior.

In this paper I discuss four aspects of early interactions which, I suggest, contribute specifically to the development of aesthetic imagination, or at least to abilities that in themselves are requisite to aesthetic imagination: imitation as a relational phenomenon; crossmodal, supramodal, and nonverbal processing and interpretation; sociality and affiliative reinforcement; and play as "comparison." In actual interactions, of course, these four features are inextricable and even interdependent. Here the poet Wordsworth's project of "an ontogeny of the imaginative faculty, formulated in terms of the growth of the mind in response to natural objects" (see Steen 1998) is expanded to include among these "natural objects" *people (caretakers) in intersubjective interactions* and to incorporate phylogenetic or adaptive value as well.

Features of Early Interactions Relevant to Aesthetic Imagination

Imitation as Relational

Most students of the subject (e.g., Boyd and Richerson 1995, Donald 1991) consider human imitative ability to be important, even crucial, to human evolution. Mitchell (1994, 178), in his consideration of the evolution of primate cognition, concurs that simulation of the external world is a primate adaptation upon which the human mind is based. According to Boyd and Richerson (1995), "true" imitation occurs when younger animals observe the behavior of older animals and learn how to perform the behavior by watching. This is to be distinguished from learning by "social enhancement" or simple proximity—each implies a quite different psychological mechanism. (Hauser [1996, 350] finds only weak evidence that apes are able to imitate). Merlin Donald (1991, 16) considers the ability to *mime*—that is, to re-enact events—to be perhaps the key hominid innovation that distinguishes *Homo* from its predecessors. For Donald, in fact, the mimetic is a mode of cognition (Donald 1991, 191). Significantly, one sees its rudiments in newborn human infants.

Authorities do not all concur in their descriptions or definitions of imitation, or agree when "true imitation" is taking place. For example, an overview of primate imitation includes yet other terms such as "representation" and "image making," as well as claims that, in primates,

imitation, pretend play, deception, self-recognition in a mirror, and communication of nonnatural meaning are all apparently based on recognizing and utilizing some knowledge of *resemblance* (Mitchell 1994). Mitchell's essay considers the subtleties inherent in terms like simulation, imitation, and representation in the sort of detail that cannot be attempted here. However, for the purposes of this paper, let us grant the existence of an important class of imitative behaviors that include phenomena such as mirroring, matching, motor mimicry, and simulation.

Studies have shown that infants (between birth and three weeks of age) can imitate facial expressions such as lip and tongue protrusion, and hand opening and closing (Meltzoff and Moore 1977; Meltzoff 1985; Kugiumutzakis 1993), and can discriminate among an adult's facial expressions of sadness, fear, and surprise with corresponding expressions of their own (Field et al. 1982). Although it appears to be the mother (or adult) who leads in the dyadic interactions of "babytalk," she is responding intuitively or unconsciously to ever-changing split-second indications by the infant of its emotional state (Papousek and Papousek 1997). That is, there is a two-way transmission of expressive signals in what Colwyn Trevarthen calls "primary intersubjectivity" (Trevarthen 1992).

Human infants' precocious capacity for imitation may or may not be "intentional." Trevarthen and Aitken (1994, 599-600) maintain that it is purposeful, "used in a regulatory or creative way to negotiate a communicative exchange or dynamic interaction in which the partner, too, is imitating." Intentionality aside, however, infant imitation does require perceptual-cognitive abilities (a) to perceive another's act, (b) to "translate" the perception into analogous acts of one's own, and (c) to sequence motor actions so that one's behavior corresponds to the model (Meltzoff 1985, 3). For newborns, according to Andrew Meltzoff (1985, 27), neuronal representation is a precondition for imitation, not an outgrowth of it.

Relevant to Meltzoff's claim are recent findings about "mirror neurons" in the macaque motor cortex that fire both when the animal performs specific hand motions, and when it views those specific motions being carried out by someone else (DiPelligrino et al., 1992; Rizzolati et al. 1996). According to Marc Jeannerod (1993, 190), "this very striking result supports the idea of representation neurons as a common substrate for [both] motor preparation and imagery." (Interestingly, Mitchell (1992, 200) finds that even *pretend* and literal percepts map to the same internal representation). Such findings show that, with appropriate body-to-body mediation, neurone activity in one brain can *imitate* neurone activity in another brain (Trevarthen, Kokkinaki, and

Fiamenghi 1999). Neuroscientists consider it likely that mirror neurons will also be found for other gestures, including facial movements (e.g., Brothers 1997).[2]

A recent paper suggests an interesting way of conceiving how imitation between mothers and very young infants occurs—i.e., as *a correspondence to some degree with the form and/or timing of the act of another individual* (Trevarthen, Kokkinaki, and Fiamenghi 1999). Imitation in this sense involves a transfer of some amodal perceptual effect "beneath" or "inside" modalities, and exhibits both intermodal equivalence (of sensory perception) and motor equivalence (of the temporal pattern of motor execution). For example, a mother's upward head and eye-widening movements imitate the contour of her infant's vocalization, or the baby's arms and legs move faster as the parent's vocalizations intensify.

Thus imitation as it appears in early interactions is different from our common idea of "baby see, baby do"—a young individual consciously mimicking or copying an adult partner's particular expression or movement. Rather, early imitation is more accurately regarded as a regulatory interpersonal process that relies on temporal coordination of behavior in more than one modality, and in this sense is a dyadic or interactive—not individual—behavior, that engages and coordinates the affective motivations of two different individuals (Uzgiris 1981; Trevarthen, Kokkinaki and Fiamenghi 1999).

Neural Processing as Crossmodal, Supramodal, and Nonverbal

In babytalk, then, the mother provides a multimodal, temporally-organized package of sensory stimuli from face, voice, and body. This visual, somesthetic, auditory (and olfactory) sensory input converges in the infant's orbitofrontal cortex, which is involved in the formation of *cross*modal (intermodal) associations and which projects extensive pathways to subcortical motivational and emotional integration centers (Schore 1994, 35; Tucker 1992). (The infant's behavior, of course, produces corresponding neural activity in the mother). Such neural interactions may correspond to what Antonio Damasio calls higher-order crossmodal convergence zones (Turner 1996, 23).

Dynamic *supra*modal features of intensity, contour, rhythm, and duration—all of which apply to voice, gesture, and facial expression—are also part of this package (Stern et al. 1985). At three to four months, infants and mothers spontaneously (i.e., unconsciously) match each other's direction of affective change crossmodally and supramodally, with mutually-regulated

facial mirroring, kinesic and vocal turntaking, and kinesic and vocal movements and prolongations or "holds" (Beebe and Lachmann 1988, 316-320).

It should also be emphasized here that although mothers "talk" to their babies, the multimodal messages in early interactions are *nonverbal*. What mothers convey to infants are not their verbalized observations and opinions about the baby's looks, actions, and digestion—the ostensible content of talk to babies—but rather positive affiliative messages about their intentions and feelings: You interest me, I like you, I am like you, I like to be with you, You please me, I want to please you, You delight me, I want to communicate with you, I want you to be like me.

Sociality and Affiliative Reinforcement

In their intermodal mirroring, matching, and imitating during early interactions, infant and mother "simulate" not real-world events, but their own affective state and intention and the degree of their relatedness. The sensory input and dyadic coordination of babytalk are organized within a common temporal framework that transcends modality (Stern et al. 1975) and includes rate, rhythm, pausing, reaction time, interruption, and turntaking (Jaffe et al., *in prep*). As the desynchronization experiments (described above) make clear, it is the precise interactive contingency of these expressions that keeps the mother-infant engagement going with a positive quality (Trevarthen and Aitken 1994, 602).

Increasing numbers of researchers emphasize that the human mind is fundamentally a social mind. Many now claim that hominid brain expansion was largely driven by social factors (e.g., Humphrey 1976; Donald 1991; Brothers 1997). Brothers (1997, 98), for example, suggests that face-to-face interaction, which places demands on working memory, may have driven frontal lobe expansion. Additionally, "it takes socialization to produce organized thought and behavior in every human being, socialization for which our brains are innately prepared" (Brothers 1997, 68). Robin Dunbar (1993, 1996) suggests that language (co-evolving with enlargement of the neocortex) originated as a response to the social complexities inherent in increased group size, replacing social grooming.

Emphasis on the primacy of sociality in the evolution of our species is strongly supported by mother-infant interaction studies. Interestingly, the signals spontaneously and universally used by caretakers in early interactions to communicate their affective state and intention to babies are all exaggerations and repetitions of vocal, facial, and gestural behaviors

universally used among adults to indicate positive *affiliative* readiness or intent.

In addition to the repetitive and exaggerated *affiliative vocalizations* of infant-directed speech (the high pitch, soft volume, inviting pauses, and gentle undulations of which are nonthreatening and nonassertive),[3] mothers use exaggerated *affiliative facial expressions* of Look At, Eyebrow Flash, Raise Eyebrows, Head Bob, Smile, and Nod (Schelde and Hertz 1994; Grant 1968, 1972) and Mutual Gaze, and rhythmically repeated *affiliative gestures* (Touch, Stroke, Pat, Hold hand, Groom, Hug, and Kiss). Such gestures, and some of the facial expressions, are also conspicuous in affiliative contexts in other primates, particularly in chimpanzees and bonobos (deWaal 1997).

I suggest that ancestral human mothers who made such expressions, movements, and sounds not only attracted and sustained infant attention and arousal, but also *thereby reinforced—through proprioceptive feedback—their own affiliative feelings* towards their increasingly altricial and demanding infants (see Ekman 1992; Zajonc 1985; Zajonc, Murphy and Inglehart 1989). Ancestral infants who responded by fitting in with maternal expression, by eliciting and then participating in the affiliative communion, by crossmodally matching, mirroring, and the other forms of imitation, would have attracted better maternal care and commitment (see also Daly and Wilson 1995).

Deceptive or phony signals would not have adequately reinforced maternal affiliative neural circuits, and deceitful mothers would therefore have cared less for their offspring. The precocious abilities of infants to elicit and respond to contingently interactive affiliative visual, vocal, and kinesic signals of caretakers suggests a primary human capacity and need for social-emotional relationship, not simply for protection, reassurance, or care (as implied by the classical theories of attachment [Bowlby 1969], parental investment [Trivers 1972], and parental solicitude [Daly and Wilson 1995]).

It is important to note that even the most careful and informed studies of parent-infant communication by evolutionary psychologists (e.g., Fernald 1992, Daly and Wilson 1995) have not yet taken sufficient account of the exquisite and subtle coordinations of interactive behaviors between infants and adults, described by psychological researchers over recent decades. Although these studies have been conceived within other theoretical perspectives—e.g., psychotherapy, psycholinguistics, or general developmental psychology—their implications are pertinent to theoretical concerns and interpretations within current evolutionary psychology.

I propose that mother-infant interaction be considered as an adaptive,[4] evolutionarily-endowed ritualized dyadic behavior, one that both partners

are predisposed to engage in—i.e., to elicit and respond to (Dissanayake 1999, 2000, *in prep.*). Let us examine this notion.

Ritualization is an evolutionary process first described by ethologists for nonhuman animals, in which components of a behavior that occurs as part of normal, everyday, instrumental activity—such as preening, nestbuilding, preparing to fly, or caring for young—are, as it were, "selected" or taken out of context, "ritualized," and used to signal (i.e., communicate) an entirely different motivation—usually an attitude or intention that may then influence the behavior of another animal. For example, the head movements used instrumentally by gulls to pluck grass for building a nest may be co-opted and ritualized to signal aggression (thus driving another gull away), or behaviors derived from feeding young (e.g., touching bills, offering a token with the bill, coughing as if regurgitating) may become ritualized and used for courtship (Tinbergen 1952).

In the course of ritualization, particular changes occur in the original behavior pattern so that the resulting signal becomes prominent and unmistakable (Eibl-Eibesfeldt 1989, 439-40). Compared to the original instrumental or "ordinary" precursor behavior, ritualized movements *become "extraordinary"* and thus attract attention. They typically become (a) simplified or formalized, and (b) repeated rhythmically, often (c) with a "typical" intensity (Morris 1957)—that is, with a set regularity of pace. The signals are frequently (d) exaggerated in time and space, and (e) further emphasized by the development of special colors or anatomical features.

One can consider the unique hominid adaptation of babytalk as a biologically ritualized behavior, where visual, vocal, and kinesic expressive signals drawn from adult affiliative contexts—e.g., smiles, nods, eye-widening, soft undulant sounds, touches, caresses, mutual gaze—have become exaggerated in time and space, simplified, stereotyped, and organized into jointly-maintained, regularized temporal sequences (Dissanayake 1999, 2000, *in prep.*). The signals' original function and motivation of expediting ordinary social life have changed so that they now canalize maternal affiliative intentions and directly reinforce the bond between mother and infant.

Eibl-Eibesfeldt (1970, 100) lists nine changes that occur during ritualization of behavior in nonhuman animals. Although specific details may vary crossculturally, as well as between dyads of any culture, eight of the nine changes are identifiable in most mother-infant early interactions. (The ninth—conspicuous change in body structure, as in plumes, crests, manes, and so forth—does not occur in human mothers).

Play as "Comparison"

In human mother-infant interaction, as in other instances of animal ritualization, exaggeration and stereotypy (e.g., prolongation, patterning, repetition) attract and sustain attention, as well as strengthen the salience of the affiliative messages. At the same time, however, the very regularity or stereotypy of the sequentially-organized behavior in early interactions makes possible the development of expectancy or anticipation of what might come next. As infants mature, they indicate their readiness for increased stimulation. Thus, in interactions with infants older than three months, mothers use conspicuous deviations from the underlying regularity and repetition of earlier babytalk—more dynamic and dramatic variations in their facial expressions, body movements, and vocal pitch, speed, and volume.

This playful manipulation by the mother of the infant's anticipation creates a new kind of emotional response, now based on uncertainty, surprise, and delayed gratification of expectation. Built upon the predictable stereotypy of ritualization, playfulness with the "givens" of the interaction enters the relationship and becomes an intrinsic, if novel, component that itself contributes to the bonding, socialization, emotional referencing, and the other benefits to infants that were listed above. Significantly, also, play is *fun*: it produces smiles and laughter (which is biology's way of saying "Do more of this!").

Surprise, uncertainty, and deviation from the expected are all components of play and contribute to its emotional effects. Like "imitation," play is a broad and indefinite concept, including notions of pretense, caprice (nonseriousness), humor and imagination. Van Hooff, for example, identifies the essential ingredient of humor as "*playful* interpretation of incongruous and unexpected configurations and events [which are] affectively and cognitively mastered and appreciated as non-threatening and non-serious" (van Hooff 1989, 136 [italics in original]).

One might argue that an infant first experiences playfulness in its mother's mock and exaggerated facial expressions, which express metacommunicatively that "this is only play." Leslie and Happé (1989) and Mitchell (1994, 193) consider exaggeration itself to be a metacommunicative marker. Further metacommunicative elements arise as early interactions incorporate more and more unpredictability or incongruity. For example, infants can experience pretense and caprice—that others' intentions are not-

for-real and non-serious—in games such as "This Little Piggy" or peek-a-boo, where the mother playfully manipulates their expectation.

Van Hooff (1989, 130) finds the sense of play to be inextricably bound up with "comparison," an observation that seems critical to a concern with imaginary representation or decoupled cognition. The variation within repetition of babytalk gives infants practice in comparing and evaluating subtle differences and discrepancies from the expected. Perhaps the earliest examples of decoupled cognition arise when an infant "compares" a variation of a behavior with its expected prototype and recognizes (and appreciates) its simultaneous similarity and difference. Decoupling also occurs in the infant's "mood of willingness" (van Hooff 1989, 128) to laugh and play, i.e., to respond to and be complicit with the mother's metacommunicative signals that a behavior such as peek-a-boo, tickling, gentle teasing, or manipulation of expectation is incongruous and "nonliteral," not to be taken seriously.[5]

In this discussion of play, we have come back full circle to "imitation," but now in a different mode—from imitation in the very earliest spontaneous or unconscious dyadic mirroring or intermodal and supramodal matching to imitation as simulation or pretense, the deliberate manufacture, acceptance, and appreciation of the fictive or imaginary. In the earliest interactions, mother and baby coordinate their interpersonal timing and mirror each other's moods; eventually, the baby's sensitivity to timing is turned to new account—not mirrored, but manipulated. In this way, both partners participate in an "extra-ordinary" ritualized/play world of exaggeration, pretense, and novelty that exists alongside the everyday world and, what is more, is shared.

I do not consider decoupled cognition in humans, at least in play, pretense, and the arts, to be an evolutionary or cognitive problem. On the contrary, it seems to have been an evolutionary and cognitive necessity. What early interactions tell us is that pretense (or "the unreal") is first experienced within a "real," shared context, initially by means of analogical intermodal representations that have intrinsic and pervasive emotional valences or overtones, and subsequently in playful, emotion-engaging manipulation of expectation.

As cognitive and evolutionary scientists or readers and theorists of literature, we tend to assume that analytic, abstract, verbalized cognition is dominant. Certainly for scientific and academic investigation and communication it is essential. But we forget, at our peril, how much of our thinking and communication is imbued with analogical, unverbalizable, unconscious content, just as is the case for our earliest experiences of pretense

and decoupling in mother-infant early interactions. In nonverbal, intermodal, analogical mentation, space and time interpenetrate, there is no tense, no simple negation, no modal markers (Turner 1996). Mark Turner (1996, 114) has referred to the "blending" that is a mainstay of early childhood thought and to "image schemas" and other body-based categories by which humans conceive their world (see also Lakoff and Johnson 1999). Merlin Donald (1991, 144) suggests that vocal and mimetic nonlinguistic representations of the world no doubt preceded language, and reminds us that much human culture (e.g., trades and crafts, games, athletics, many art forms, aspects of theatre, and most social ritual) functions even today with little or no symbolic language (Donald 1991, 167). Our original analogical, nonverbal, intersubjective mind persists after infancy, but it is usually consciously overridden by "cognition" and language (which are necessarily "coupled" to the real world) so that we are generally unaware of it.

Social and Emotional Substrates of Decoupled Cognition

Some concluding remarks seem relevant with regard to the critical importance of social and relational factors in the development of decoupled cognition in aesthetic imagination. These factors seem especially challenging to contemporary cognitive science and evolutionary psychology, which traditionally conceptualize the adapted mind as primarily self-interested and practical-problemsolving rather than intersubjective and imaginative.

The autistic child, unmindful of social need and reciprocity, is nature's unintended model of simple self-interest, in contrast to normal infants who, as I have described, are predisposed from birth to engage in emotional communication with others, and, through these engagements, develop imaginative empathy—the ability to conceptualize others' mental states and to understand others' expressions of emotion. The occurrence of autism and other empathic disorders has been traced to faults in early brain growth, when core motive systems for human contact and for imitative and reciprocal relations with others fail to develop normally (Trevarthen and Aitken 1994).[6]

Autistic persons notably lack what is called a "theory of mind," the ability to appreciate another's subjective life—that other people have beliefs and desires. Autistics cannot interpret others' facial expressions or their "emotional" behavior. They are deficient in pretend play, especially pretend play that involves others, and prefer instead to play with objects. They do not engage normally in reciprocal interactions with others.

Significantly, it is precisely the abilities in which autistics are deficient that emerge and are developed in early interactions: interest in facial expressions, reciprocal awareness of another's intentions and motivations, and participation in (and appreciation of) intersubjective play—from the earliest imitations, which involve intermodal matching and temporal coordination, to the practiced attunements and deviations from expectation that give rise to actual pretense. Appreciating that theory of mind originates in affiliative coordination augments the received view in evolutionary psychology that a theory of mind is indispensable for "Machiavellian intelligence" (Byrne and Whiten 1988)—the ability to predict and counter the misrepresentations and pretenses of others as well as to manipulate others with one's own misrepresentations and pretenses. In our primate ancestors, Machiavellian intelligence may well have been an originary or driving force for developing knowledge of other minds. However, in bonobos, at least, and in humans, theory of mind has become equally crucial as a means for developing reciprocity and cooperation (deWaal 1997; Trevarthen and Aitken 1996).[7] In humans, pretense is not only Machiavellian—that is, duplicitous or two-faced, but, equally so, is "Kropotkinian" or "Bonobian"—that is, mutual: intersubjectively co-constructed and one-hearted.

The coordinated interpersonal timing that makes possible early interactions is a "true" or iconic representation of accord—not "put-on" or artificial: a pair is or is not in synch. Thus, at least in humans, it is only within a familiar, nondeceptive, participatory experience of intention and motivation that decoupled cognition and appreciation first occurs. (Autistics, without that experience and practice, lack both guile and imagination).

That affiliation and social sympathy are integral to simulation or pretense makes clear that human minds are *not* individual and solitary, as assumed by much of traditional Western thought (including evolutionary psychology and cognitive science), but inescapably and unconditionally social.

If our intersubjectivity is required for playful interaction and imagination, it may well also be essential for appreciating and engaging in the arts. It is relevant in this regard that autistics are deficient in responding to the arts or to "beauty." The well-known autistic person, Temple Grandin, is a gifted visual thinker but she does not respond emotionally to visual stimuli or visual art (Sacks 1996). She says that she does not "get" what other people say they find in their experiences of music. These inabilities may be at least partly explained by her difficulties with intersubjectivity—that is, her impaired capacity to respond to subtleties of temporally-presented, emotionally-colored, multimodal signals. Having a theory of mind

implies not that we simply think about someone else's thoughts, but that we also recognize and even share their feelings about these thoughts. In the imaginary representations of others—say, in the literary arts—we feel not actual emotions like love, fear, dejection, or degradation, but *sympathy* for the characters who are in circumstances where *they* feel those emotions. Again, this is a kind of decoupled cognition, which takes place within a pretended (but not unreal), shared sociality.

As described at the beginning of the essay, decoupled cognition includes dreams, pretense, play, mental-state attribution, language and art, all of which (except for dreams and pretense) are essentially *social* behaviors (and dreams and pretense occur in large part with relation to other people). I have hypothesized (Dissanayake 1999, 2000) that adult aesthetic response (to arts like poetry, music, and dance, which unfold in time) is built upon the same fundamental or innate competencies and sensitivities to temporal and dynamic elements that are spontaneously used by mothers in babytalk to engender and sustain affiliative emotion and accord. If this is so, engaging in the arts may serve not only for competitive sexual display (Miller 1998) or as a "training mode" for building cognitive structures or "scenarios" (Alexander 1989)—the usual suggested adaptive functions for the arts—but as ways of creating and sharing emotional communion with other humans, thereby transmitting group knowledge and instilling a sense of "coping" that could relieve individual anxiety, and foster one-heartedness and social solidarity.

It is interesting that the mechanisms and responses used and developed in early interactions—repetition, exaggeration, formalization, and dynamic variation in space and time—resemble the methods and effects of the temporal and performing arts of dance, song, mime, and literary or poetic language. My account of the development of imitation in infants from unconscious intermodal matching to appreciating the deliberate manufacture of pretense describes not only the ontogeny of mother-infant interactions but, as I have suggested elsewhere (Dissanayake 1999, 2000), the phylogeny or evolutionary trajectory of becoming *Homo aestheticus*.

In the arts, it seems that we respond sympathetically through a capacity for what might be called "emotional" narrative, based on the sensitivities developed in early interactions. All the arts, particularly the arts of time, make use of slight expansions and contractions of intensity in space and time (e.g., of speed, force, and duration of vocal and kinesic movement). Like mothers and infants in early interactions, artists and performers convey nonverbally to their audiences the anticipation and fulfillment of beginnings

and endings, implications and realizations, antecedents and consequents, qualifications and subordinations; they use entailment, contrast, redirection, opposition, turntaking, pacing, and release (see also Dissanayake 1999). These "grammatical" or "narrative" nonverbal abstractions are as integral to the content and effect of imaginary representations as are their imagery, plot, and other more easily describable components. Indeed, coordinated interpersonal exchange is the earliest communicative system and, I suggest, a scaffolding for all subsequent social communication—including eventual spoken language, and imaginary representations such as the arts.

The similarities between the developmental course in immature infants of imitation and pretense and the ways the arts present imaginative representations to mature adults argue not only for the deep-rootedness of our aesthetic nature but for the fundamental importance of intersubjective and affective dimensions of the adapted mind. Infant intersubjectivity and adult aesthetic experience are at least as relevant to our understanding of the workings of the human mind, and of the selective forces that molded it, as are the typical models invoked by evolutionary psychologists—tit-for-tat, game theory, and prisoners' dilemmas.

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Notes

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1. I use this colloquial term, rather than the more academic "motherese," "parentese," or "infant-directed speech." These words apply to adult speech to infants; "babytalk," in contrast, is used to refer to the interactive behavior of face, voice, and gesture between adult and preverbal infant. I do *not* refer to the modified or distorted speech by adults to older babies and toddlers where words are simplified (e.g., "Go get your blankie and let's go night-night").
2. Trevarthen (1998, 13) proposes that the polyrhythmic motor coordinations that are fundamental to human mimesis (including its manifestations in drama, poetry, and music) involve integration of association and prelimbic cortices with several subcortical afferent and efferent centers, most important among which are the pulvinar, medio-dorsal thalamic nucleus, ventral striatum and cerebellum, the latter integrated with intrinsic pacemakers of the medullar and midbrain. The peri-insular parietal cortex and the prefrontal cortex are in close anatomical linkage with these subcortical systems. See also Trevarthen and Aitken (1994) for infant neuroanatomy and neurochemistry that predispose and facilitate early interactions.
3. Mothers in some societies (e.g., North-Central Arnhem Land Aborigines [Hamilton 1981]) use regularly repeated tongue clicks and lipsmacks, more than vocalizations, with their babies. These behaviors resemble lipsmacking in baboons and macaques, which van Hooff (1989, 135) interprets as a ritualized intention movement of the affiliative behavior of grooming. Incidentally, van Hooff (p. 136) interprets laughter as a ritualized intention movement of affiliative "mouthing" (in preparation for grooming) in

combination with a breathing pattern expressing the oscillation of tension and relaxation. (See the following section on Ritualization).

4. Although space does not permit here, one can make a case that early interactions satisfy the seven formal properties that characterize an adaptation, described by Tooby and Cosmides (1995).
5. An orangutan infant was observed to play peek-a-boo with its father and to laugh and give a play face (Chevalier-Skolnikoff 1982); it also made a play face when it saw the father hanging upside down, as if appreciating incongruity. Both monkeys and chimpanzees make play faces in social interaction, but only chimps and humans do so when playing alone (van Hooff 1989 130-31).
6. Right hemisphere-damaged patients, also, often seem unable to honor the world of the fictive, the imaginary, and the humorous, and are impaired at understanding intention and plausibility. Although they understand phonology, syntax, and the literal lexical aspects of language, they are impaired at comprehending nonliteral information, jokes, stories, and adages that require later integration (Gardner et al. 1983).
7. Mitchell (1994, 208) remarks that pretense evolved for manipulation and deception, but became independent of this function in apes and "even more in hominids." Brothers (1995) points to the undoubted "spiralling effects of deception and counterdeception" on the necessity for an animal to be able to predict the intentions of others, but she also emphasizes that a theory of mind is necessary for social learning.

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