

## **Beyond Words: Parental Embodied Mentalizing and the Parent-Infant Dance**

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How does the sense of a subjective self develop? Cutting through philosophy through psychoanalytic psychology to contemporary neuroscience and developmental psychology, one finds the common premise that the self can fully emerge only in the presence and in relation to another self. That is, the infant's subjectivity and mind can emerge only through interacting with a responsive, reciprocal caregiver. In this chapter, we advocate the proposition that not just any encounter with the other, but that the infant's full development as a subjective being in this world depends on the quality of the *embodied* experience with the caregiver. Representing an attempt to capture the quality of this relational embodied encounter between the parent and the infant, we will present the concept of Parental Embodied Mentalizing and how it can be measured. We will then suggest reconceptualising attachment security in terms of embodied processes and present the concept of "*embodied attachment*".

### **Infants Need Others for their Minds to Evolve**

Representing a relational approach to early development, developmental and psychoanalytic scholars stipulate that the parental capacity to consider and treat the child as a psychological agent motivated by mental states—to mentalize—influences the infant's

development (Fonagy, Gergely, Jurist, & Target, 2002; Slade, 2005). Reddy (2008) has offered perhaps the most comprehensive recent account of factors that contribute to the emergence of mentalizing. Reddy proposes that mentalizing emerges through facilitation by a “second-person”. She suggests that we come to know of other minds only through interacting with them and by observing their responses to us and through our responses to them. This requires engagement with the person. Reddy reacts against the traditional literature on mentalizing which almost exclusively sees its development as an individual rather than as a social process, despite the evident and profound social function which mentalizing plays in human behaviour. She makes an ironclad case that knowing minds takes place for both infants and for adults through engagement with other minds. The richer this engagement, the richer a person’s representation of mental states is likely to be. Thus, the starting point for understanding other minds is not isolation and ignorance but attachment relationships.

Indeed, research shows that the parent’s capacity to consider and treat the child as a psychological agent motivated by mental states—to mentalize—is associated with infant attachment security (e.g., Arnott & Meins, 2007; Oppenheim, Koren-Karie, & Sagi, 2001), even in the face of trauma and deprivation (Fonagy et al., 1995).

In turn, we have argued (Fonagy, Gergely & Target, 2007; Shai & Belsky, 2011a) that evolution selected the attachment relationship for conveying knowledge about minds to the human infant, and that the quality of the relationship with the attachment figure will therefore impact profoundly on the rate of development and the child’s competence in mentalizing (e.g., Fonagy, Redfern, & Charman, 1997). Also high reflective parenting practices, parental discourse about emotions, the depth of parental discussion involving affect, and parents’ beliefs about parenting were found to predict the child’s precocious mentalizing capacities (e.g., Sharp &

Fonagy, 2008).

The strongest evidence corroborating the significant role the parent's mental representations of the child as a psychological entity plays in child development comes from observations that the inclination of mothers to take a psychological perspective in relation to their own actions or in relation to their child, including maternal "mind-mindedness" and "reflective function" as they interact with or describe their infants, is associated with both secure attachment and mentalizing (Fonagy & Target, 1997).

In current research on parental mentalizing, whether conceptualized and measured as Parental Reflective Functioning (Slade, 2002), Maternal Mind Mindedness (Meins, 1999), or Insightfulness Assessment (Oppenheim et al., 2001), parental representation of the child's intentionality—parental mentalizing—is conceptualised and measured via verbal expressions and treated as a reflective, semantic, and declarative capacity. There are substantial limitations for this approach.

The main conceptual caveat that remains is explaining how the parental mental representations—parental mentalizing—influences the infant's mind, that is, his or her attachment representations and mentalizing capacities. In other words, what is the *mechanism* through which parents actually come to influence their child's socio-emotional development? This conceptual lacuna is also reflected in the measurement of parental mentalizing; since all current measures either necessitate reflection and measure abstract mental representations (such as the Reflective Functioning or the Insightfulness Assessment) and/or examine the parent's mentalizing capacity via linguistic means (such as Mind-Mindedness), they remain limited in their ability to illuminate how this verbal content can influence the preverbal infant, which is likely to be restricted in his or her ability to differentiate between the linguistic subtleties

assessed by these measures.

Attempting at addressing these two caveats, we present Parental Embodied Mentalizing (PEM; Shai, 2010a) —a theoretical and operational approach that investigates the meeting of parental and infant minds with an explicit focus on the whole-body movements unfolding in the dyadic interactive process while excluding any verbal input. Discussing the concept of PEM will be divided into two; the first part will outline growing support for the premise that parental mentalizing can and is an embodied phenomenon. The latter part of this essay will focus on the implications of such a conceptualisation how we understand and define attachment security.

### **Parental Mentalizing is an Embodied Phenomenon**

There is abundant data showing that preverbal infants have rather sophisticated capacities for social communication and have at their disposal a rich and subtle nonverbal language that they make use of to express internal states such as pleasure, excitement, curiosity, frustration, or fear and to engage their parents. The infants' faces, voices, hands, and entire bodies display their varying internal states, their seeking of interpersonal contact, and the testing of changes in the external reality (Trevarthen, 2004; Tronick, 2007). Parents have been shown to be highly sensitive to these nonverbal communicative signals of their infants (e.g., Beebe et al., 2010; Tronick, 1989), using nonverbal communication to engage with and relate to their infants, seeking to foster their relatedness. The nonverbal modalities parents use to communicate include head movements, paralinguistic speech properties, touch, posture, and facial expressions, all conveying through their quality the degree to which they are emotionally available to the infant's varying internal states (Stern, 1985; Trevarthen, 2004).

Indeed, young infants are highly sensitive to parents' emotional and intentional signals that are expressed through the form and intensity of communicative gestures across modalities

(Emde, 1988; Malloch, 1999) and are capable of modifying their affective and attentional bodily displays in a reciprocally coordinated manner (Beebe, 2000; Tronick, Als, & Brazelton, 1977). Specifically, they appear to have remarkable capacities for detecting regularities in events, to perceive contingency and its degree, and to anticipate when events will occur. They perceive temporal relations between environmental events, and between their own behaviors and environmental consequences, by estimating probabilities of “if-then” sequences (Watson, Futo, Fonagy, & Gergely, 2011) and are quite sensitive to ways that their behaviors may or may not be responded to in a contingent manner (e.g. Beebe et al., 2010). Trevarthen (2004) maintains that examination of the communication of infants with adults reveals the child’s innate sensitivity to the rhythms and expressive forms of other people’s movements that carry affective messages.

Pipp (1990) states that the bodily self and the bodily other are the sources of action that form together the sequences comprising infant-parent interactions. Indeed, considerable body of evidence indicates that nonverbal parent-infant interactions are characterized by bi-directional or mutual influence, in which both parent and infant respond to the partner’s nonverbal behaviours to influence their own (e.g., Beebe, 2000; Evans & Porter, 2009; Tronick, 2007). Importantly, the quality of the parent-infant multimodal dialogue—nonverbal, reciprocal, rhythmic, and temporal exchanges between parent and infant—is associated with crucial developmental achievements, including forming attachment relationships, developing a sense of agency and effectiveness, and self-regulation (e.g., Beebe et al., 2000; Evans & Porter, 2009).

During such a nonverbal dialogue, in which both parents and infants express their minds and respond to the other’s mind mainly without awareness, the parent’s ability to make sense of the infant’s nonverbally expressed internal world – to mentalize – is of pivotal importance. The nature of each partner’s contingent coordination with the other affects the infant’s ability to

attend, process information, and modulate behavior and emotional state. These reciprocal contingency processes are essential to the creation of infant and parental social expectancies and interactive efficacy, and to infant cognitive development (Stern, 1985). Trevarthen (1977) describes the mutual regulation of joint action as a “dual prospective motor control”: both partners anticipate in detail what the other will do. One translation of this concept is what the infant experiences being experienced (Beebe et al., 2010).

Considering the sophistication and implications of this nonverbal reciprocal encounter between parents and infants, and keeping in mind the importance of parental mentalizing on the child’s socio-emotional development, it is surprising that parental mentalizing is currently conceptualized and measured solely via declarative and linguistic means. Current approaches to parental mentalizing that rely on metacognitive semantic expressions of mentalizing are thus fundamentally limited in illuminating the interactive process—the *mechanism*—through which the preverbal infant is influenced by parental mental capacities.

In line with Stolorow and Atwood's (1992, p. 46) assertion that “the caregiver’s affect attunement is communicated primarily through sensorimotor contact with the infant’s body”, we (Shai & Belsky, 2011a, b) suggested investigating the observable aspects of parent-infant interactions to further elucidate the mechanism through which parental mentalizing is transmitted to the infant to impact his or her development. Specifically, we proposed considering parental mentalizing as an embodied—*in the body*—phenomenon, and investigating the embodied ‘dance’ the parent and infant implicitly choreograph together via their dynamic, interactive kinaesthetics.

This must be based around a most probably innate capacity of the human infant to ‘experience’ the experience of their social environment. Experience initially is primarily somatic

(bodily) and is profoundly grounded by somatic experience in the womb. This gives prominence to an embodied subjectivity that can form the basis of inter-subjectivity through a co-construction of somatic experience within attuned bodily interactions with the caregiver. The mechanism may be provided through the fundamental “vicariousness” (Rochat, in press) of human experience. The connection of bodily experience to what we might call ‘lived experience’ (the experiencing of the movements and sounds of the world external to us) creates substrate to interpersonal relatedness. What I see and what I hear is given meaning through its relationship to bodily experience. Emotions will colour this experience and bias actions in relation to this colouring (Lambie, 2009). The emotional tone generated in the experience of mutual correspondence is shared, co-constructed by infant and caregiver.

### **Parental Embodied Mentalizing (PEM)**

We have already established that consideration of the ample data demonstrating the richness of early nonverbal parent-infant interactions calls for revisiting parental mentalizing such that it is no longer treated as a linguistic or a declarative capacity involving explicit reflection on emotional experiences but is also expanded into the implicit, body-based interactive processes between the parent and the infant.

Indeed, recent neuroscientific advances make the restricting of mentalizing to the declarative (explicit) domain inconsistent with neuroscientific evidence. Pointing at independent neural circuits, this data supports discriminating between implicit – automatic, unconscious, and nonverbal – mentalizing and controlled – explicit, verbal, reflective, and aware – mentalizing (Keysers & Gazzola, 2006, 2007; Shai & Belsky, 2011b). According to these studies, implicit mentalizing relies chiefly on the external, observable features of nonverbal bodily actions that does not necessitate reflection. Gallese (2006), for instance, argues:

“Social cognition is not only ‘social metacognition’, that is, explicitly thinking about the contents of someone else's mind by means of abstract representations. There is also an *experiential* dimension of interpersonal relationships, which enables a direct grasping of the sense of the actions performed by others, and of the emotions, and sensations they experience. This dimension of social cognition is *embodied* in that it mediates between the multimodal experiential knowledge we hold of our lived body and the experience we make of others” (p. 16, italics added).

In fact, consideration of the original definition of mentalizing reveals no requirement restricting it to such metacognitive manifestations (e.g., Fonagy et al., 2002; Meins, 1999; Slade, 2002). Reflective functioning, for instance, is defined as the “*overt manifestation*, in narrative, of an individual’s mentalizing capacity” (Slade, 2006, p. 269, italics added). This definition implies that parental mentalizing could manifest itself in a myriad of ways, including implicit and non-reflective ones. Indeed, Fonagy and Target (1997, p. 682) state, “The caregiver’s recognition of the child’s intentional stance...is communicated nonverbally, beginning at birth”.

Indeed, we (Shai & Belsky, 2011a, b) have recently suggested that parental mentalizing capacities are reflected in – and can be assessed by considering – the parent’s use of the very communicative means which infants employ: the nonverbal, kinaesthetic mode. Thus, Parental Embodied Mentalizing (PEM) refers to the parental capacity to (1) implicitly, and not necessarily consciously, conceive, comprehend, and extrapolate the infant's mental states (such as wishes, desires, or preferences) from the infant’s whole body kinaesthetic expressions, namely changes in body movement and posture and (2) adjust their own kinaesthetic patterns accordingly. Importantly, and reflecting a relational perspective, the parental kinaesthetic behaviours are not considered in isolation, but always in reference to those of the infant.



We feel that Tronick's (2003) detailed and specific model of the way meaning and coherence emerges out of interactive processes focused on mutual regulation represents a comprehensive and rigorous model regarding the process whereby parental mentalizing capacities come to influence the infant and shape capacities in his or her mind. His thinking rapidly overtook and has now gone substantially beyond the schematic, proximity-focused attachment models that once dominated the field. Tronick's (1989, 2007) Mutual Regulation Model (MRM) of infant-adult interaction looks at the subtle, nonverbal, micro-regulatory and social-emotional processes that unfold in mother-infant interactions. Tronick understands the infant as taking part in an open thermodynamic system that must constantly take in energy and work towards coherence in order to stave off dissipation. According to the MRM model, infants have "self-organizing neurobehavioral capacities" and "biopsychological processes" that allow infants to "organize behavioral states" and make "sense of themselves and their place in the world" (Tronick, 2007, p. 14).

At the same time, however, Tronick points to the limits of the self-organizing capacities and they need to be supplemented by a "larger dyadic regulatory system" in which the infant participates with the caregiver (p. 17). In this way Tronick brings together the notion of physical sensitivity with the overriding construct of meaning making. Regulation in the MRM is accomplished through the operation of a communication system in which the infant communicates his or her regulatory status to the caregiver, who responds to the meaning of the communication. This communication is expressed through the totality of the infant's and caregiver's biopsychological processes – including the 'shape' (intonation contours) of words, other sounds each uses, momentary changes in facial expression, the quality of their touch, body movements and even changes in their body odors.

Mentalizing could be assumed to emerge out of successful mutual regulation between the partners, which in turn is probably achieved when an infant and caregiver together generate, communicate and integrate meaningful elements of their respective consciousness. This creates an experience of implicit relational knowing, meaning that each can anticipate and “know” the moves of the other. This “knowing” is initially of a pattern of physiological responses or activations rather than of intentional states although quite clearly it can be the platform knowing of intention given developmental time. The parent-infant collaboration results in a singular, organized dyadic state that is believed to be more than the sum of its parts. A six-month-old infant is likely to be capable of apprehending another’s state of consciousness, and a mutual mapping of each other’s state of consciousness, as Tronick (2007) suggests, could take place. Each individual’s sense of self is augmented by the consciousness, the bodily-derived meanings and representation of the other, as well as by representations of the relationship as a whole. This leads to what Tronick terms a state of “co-creativity” (Tronick, 2003) in which infant and caregiver shape their relationship through a process of mutual physical regulation. Co-creativity is not seen as a mechanistic series of steps nor is it assumed to be an end state (Tronick, 2003), but rather, more realistically, described as part of the unique and continuous unfolding of the parent-child relationship.

Focusing on the parental contribution to the creation of the moments of the meeting of minds, we suggest that it is parental embodied mentalizing that facilitates the formation and maintenance of such significant relational moments. Parental mentalizing constitutes the readiness to understand the infant’s mental state and the meaning he or she makes of the world. This mental predisposition enables the parent to adjust his or her own mental states to those of the infant, thereby creating a DSC. As the infant’s mind is very much bodily, kinaesthetically,

and action based, the parent's embodied mentalizing is the chief means of achieving these DSCs with infant. Tronick (2005, p. 299) describes a dyadic interaction that is, effectively, an illustration of PEM: "As part of a dyadic system with a caregiver who, by apprehending the infant's intent, provides postural support and the infant is able to free up his arms, control his posture, and bat at the object. The infant engages in a more complex action than he would be capable of on his own". PEM focuses precisely on such moments, examining the degree to which the parent's ability to appreciate the infant's kinaesthetically manifested mental state is translated into the parent modifying her/his own kinaesthetics in an attempt to fulfil the infant's intentions even beyond the infant's own abilities. In this sense, the investigation of PEM focuses on the moments in which a dance of two minds is created and delicately choreographed by both partners.

Where we find common ground with Tronick's model is in his rejection of classical attachment and other primarily narrative models that claim all relationships to be influenced by a parental prototypic model. The most helpful aspect of Tronick's contribution lies in his dynamic systems theory approach to the study of parent-infant interaction. He proposed that not only is each relationship with another person unique, but so too is each interaction with each person. At the same time, however, Tronick emphasizes the interconnectedness of relationship representations both within individual relationships and across relationships. He accounts for this by proposing that every single interaction a person has, though itself unique, can potentially alter our memory of past interactions with that or any other person (Tronick, 2007). Relational Activation Patterns (RAPs) are micro-interaction patterns accumulated and residing in experiential relational space (ERS). Together, these RAPs enable implicit relational knowing. Typically, the first of these influential RAPs is the infant-mother relationship, although each one

is fluid and changes with each interaction. In spite of their fluid nature, RAPs are also stable because of the individual's continuing perception of the ERS – that is, the context of each RAP. The infant recognizes a familiar “place” in a relationship or interaction (e.g., “now we are separating”). As each interaction subtly alters the RAPs, it creates new possibilities for co-creativity and for ways of being together.

So how can the coherence of relationship narratives emerge from RAPs? There may even be something oxymoronic between the dynamic systems theory construction of the mother - infant relationship and the notion of coherence that emerges out of the attachment theory – expectancy hypothesis. Tronick's solution is both elegant and creative, going beyond the classical Main-Hesse theory (Hesse, 2008). Tronick (2007) suggests that miscommunication and “messiness” lie at the heart of the development of self and self-regulation. Miscommunication creates negative affect, but, when interactive errors are repaired, the negative is replaced by positive affect in both infant and mother. These intense experiences in the dyadic relationship generate “coherence” of mother and infant, deepening their dyadic state of consciousness. This state expands the awareness of each, changing their RAPs and therefore their interpretation of all relationships, both old and new.

In line with this, the approach adopted in PEM does not require the parent's initial kinaesthetic behaviour to magically suit the infant's mental state. Indeed, assessing PEM involves examining the parent's ability to repair interactive dyadic errors. Clearly, then, the emphasis in PEM is far more on the dynamics of the interactive reparation than on its sheer occurrence. Recall that mentalizing does not imply being able to magically read the minds of others, but in fact being able to appreciate the opaque nature of minds, understanding that the mental state of another cannot be known with certainty (Fonagy et al., 2002). From this

standpoint, misunderstandings and miscoordinations should be of frequent occurrence. Indeed, during the first year, fewer than 30% of parent-infant face-to-face interactions are coordinated (Tronick, 1989). Intriguingly, interactive repairs in the first months of life, far more than interactive mis-coordination, play a key role in the establishment of secure attachment (i.e., more interactive repairs predict security, Tronick, 1989). Therefore, PEM regards a parent's ability to *repair* dyadic mis-coordination in the circle of communication as especially significant.

Relational disruptions and repair of ongoing regulations, where expectations are violated and ensuing efforts to resolve these breaches are made, are hypothesized to underpin the generation of further psychic structure and the promotion of self-organization (Blatt & Luyten, 2009; Freud, 1917). Winnicott (1949), for instance, emphasizes the importance of the mother's ordinary, everyday failures for the development of the infant's mind. It is her deficiencies that allow for the infant's mental activity. In fact, one of the mother's functions is to provide graduated failures of adaptation. In this way "the mental activity of the infant turns a good-enough environment into a perfect environment, that is to say, turns a relative failure of adaptation into adaptive success" (p. 245). The parental mismatching of the infant's abilities, needs, or desires is inherent in the infant's environment and provides the infant with an expended environment into and within which he or she can develop (Tronick, Als, & Adamson, 1979).

According to Trevarthen (2008, p. 12) "human feelings about intentions, and about contents and relationships that arise between us, are signalled as changing tensions and contours of muscular energy in vocalisations and gestures". Furthermore, the nonverbal information exchanged through various qualities of movement is communicative about the mover's feelings and intentions (Trevarthen, 2008). Central to PEM, then, is the explicit consideration of and the exclusive focus on *how* interactive bodily actions are performed and coordinated rather than

*which* actions are performed. What makes this argument most compelling is the synesthesia which appears to run through all aspects of the perceptual experience of the infant. In careful psychophysical studies on newborns Lewkowicz and Turkewitz (1980) demonstrated that neonates readily transfer learning from the auditory to the visual modality. So habituation to either a bright or a dimmed light reduces their responsivity to corresponding intense or soft sounds. Intriguingly, Mondloch and Maurer (2004) showed that most young toddlers systematically perceive that a higher pitch sound goes with a brighter color; or that the letter A goes with the color Red) which are also manifested by the 5% of synesthetic adults. As we shall see below, researchers of parent – infant communication to implicitly note this phenomenological correspondence across modalities for infants. It appears that embodied intentionality may be rooted in the basic ability we might all possess at birth to orient towards the shared qualities in things across differences in modality and setting. We argue that the selective advantage of this potential in the human infant is to identify the consciousness or subjectivity of the conspecific – the orientation towards ‘style’ or ‘manner’ enables the infant to be able to discern the attitude behind the action. Thus the ability to sense sameness in things that are ontologically different (Rochat, in press) contributes directly to the development of all future social competencies.

The approach adopted in the conceptualization of PEM takes on board this identification of correspondence of ‘style’ that transcends modalities noted by most investigators who advanced models of infant – parent interaction. Focusing on a ‘style’ or a ‘manner’ of an act calls attention to the shading of behavior rather than to its color. This is obviously also implicit in Stern’s (1985) key notion of ‘vitality affects’. Vitality affects are thought to be abstract qualities of processes in several different modalities and reflect forms of affect, rather than content, which

can be described in dynamic, kinetic terms, such as ‘exploding’ or ‘fleeting’. According to Stern (2002), vitality affects are present in all subjective experience, including in the conveying of any goal-directed mental activity such as thinking, feeling, interacting, or dialoguing. In this sense, vitality affects capture a form, a quality, rather than a specific content, which serve as representational formats carrying various mental processes (Koppe, Harder, & Vaever, 2008). Vitality affects are constantly present in every experience, whether or not the individual is conscious of them, and infants are especially sensitive to them. In fact, the infant is wrapped in the expressiveness of vitality affects and, according to Stern (1985), "the social world experienced by the infant is primarily one of vitality affects before it is a world of formal acts" (p. 57). Stern (1985) proposes that vitality affects – the temporal progression, the dynamics, and movement of any mental process (be they memories, thinking, or feeling) – imbue the experience with meaning.

The experience of one’s own rhythmicity and how it comes to engage with the rhythmicity of another promotes the emergence of a sense of self (and self-with-other). This significant developmental achievement is reflected in conceptualising vitality affects as the contours of affect in relation to time (e.g., accelerating, fading, surging, and exploding) (Stern, 1995, 2002). However, we suggest that an additional, highly significant aspect in the establishment of the sense of self and self-with-other is that of spatiality. We argue that a crucial element in the process of the development of a sense of self is establishing a sense of presence, volume, solidity, and mass. Furthermore, boundaries of the self need to be established to define limits between internal vs. external, me vs. not me, real vs. imaginary. Boundaries also function to contain oneself within one’s own skin, as well as to protect the individual from attacks from within and from without. All these spatial components, we contend, are imperative to the

development of self and self-with-others, and accompany every experience of subjectivity in the world. We maintain that these boundaries and other spatial qualities of experience are constituted in the very early kinaesthetic relational experiences with the parent. These, then, are experiences in the spatial realm. Thus, whereas ‘vitality affects’ refer to the dynamic temporal contours of affect (e.g., accelerating, fading, surging) (Stern, 1985, 2002), PEM also emphasises the dynamic spatial contours (e.g., retracting, approaching growing, shrinking). Hence, both temporal and spatial qualities of kinaesthetics that comprise actions come together to create a unified affective message (Feldman, 2007).

Note that the kinaesthetic communication of both infants and adults follows the principle of equipotentiality, indicating that the same type of touch or movement is capable of expressing very different meanings or intentions, especially in combination with other kinaesthetic qualities (Cicchetti & Rogosch, 1996). Conversely, different patterns of movement and touch by either the parent or the infant can convey the same emotional communicative outcome, thus following the principle of equifinality (Hertenstein, 2002).

Weinberg and Tronick (1994) stipulate that this expressive flexibility serves important functions; an infant capable of expressing the same message in multiple ways may maximize the chance that the caregiver will eventually interpret the message and respond to it in an appropriate manner. Importantly, this expressive flexibility of nonverbal communication is designed to facilitate the interpersonal encounter and promote communication between its participants. As the researchers note, “The infant makes an initial communicative attempt using a particular affective configuration or sequence of configurations and then, based on the caregiver’s response, makes another and somewhat different type of communicative effort” (p. 1513). Hence, it is the assembly of kinaesthetic qualities in the moment-to-moment interaction that



reveals their mentalistic meaningfulness (Stern, 1985; Tronick, 2005).

Clearly, then, any simplistic ‘taxonomy’ of the mental meaning of particular body movements would be misleading. Nonetheless, various movement analysis paradigms offer valuable means of characterizing human movement, though of the individual, not the dyad (e.g., Kestenberg Movement Profile: Kestenberg, 1965; Laban: Laban & Lawrence, 1947). Drawing on, but not restricted to these paradigms, several kinaesthetic patterns have been identified as of prime importance when considering parent-infant interactive processes (see Shai, 2010a, b; Shai & Belsky, 2011a). What is fundamentally important to appreciate is that kinaesthetic patterns often reflect some kind of mental state that can be reliably interpreted by an observer. Indeed, evaluating parent-infant interaction through such a kinaesthetic prism affords the careful and minute account of the interactive mentalistic exchanges taking place between parent and infant on the embodied level.

### **Embodied Attachment**

As abovementioned, the significance of parental mentalizing lies in its contribution to the quality of the child’s emotional, social, and cognitive development, including his or her sense of self as an a subjective being having agency, intentionality, and the capacity for self regulation. All of these factors contribute to establish representations of the parental figure as a secure base that can be trusted. Increasingly, researchers have come to appreciate that this valuable developmental achievement is intrinsically a relational and an embodied phenomenon. This concluding section of the paper, therefore, presents arguments supporting the argument that parental embodied mentalizing plays a central role in the formation of attachment representations.

Broadly speaking, attachment security is conceptualised as an internalized model of the

experience-based interactions of the infant with the caregiver (Bretherton, 1985). This representational model is reasonably stable over time and contexts, and therefore influences a wide variety of subsequent interpersonal encounters (e.g., Bowlby, 1973; Mikulincer, Shaver, & Pereg, 2003). However, as noted by Stern (1977, p. 11), "Before events could be verbally and symbolically represented, infants' early interactive knowledge was somehow encoded in a nonverbal register".

The infant's ongoing kinaesthetic experience of the quality of parental responsiveness to his or her mental state is presumed to be the vehicle through which interactive knowledge becomes somatically ingrained (Krueger, 1989; Orbach, 2004; Stern, 1985). The infant's ongoing sensorimotor and bodily-based mentalistic interactional experiences eventually become embodied, not as somatic states as such but as pre-symbolic mental representations (Beebe, Lachmann, & Jaffe, 1997; Gergely & Unoka, 2008) implicitly engrained in the soma, eventually establishing somatic registrations of the attachment relationship embedded in implicit memory (Crittenden, 1990; Fonagy & Target, 2007).

Whereas explicit memory deals with information and events that have been symbolically organized for recall, implicit memory includes somatic and sensorimotor encoded emotional and procedural processes. Despite the fact that these processes operate at the unconscious level, they affect and guide social behaviour (LeDoux, 2002; Modell, 1992). Indeed, repeated interpersonal interactions—responsive and non-responsive, pleasurable, frightening, or calming—all become internalized into the infant's body on every level – motor, autonomic, hormonal, and sensory (Schore, 2003). These internalized experiences, in turn, build the interpersonal sense of self derived from mapping motor-sensory elements of the body-engaged-with-another (Trevarthen & Aitken, 2001), underpinning the pervasive and unconscious expectancies known to be the

internal working models of the attachment relationship.

In this way, we contend, representations of attachment security should be considered as primarily experientially-driven, somatic and kinaesthetic experiences. We therefore call to conceptualize early relational experiences in terms of embodied attachment—early relational kinaesthetic experiences that are engrained in the very fibre of our being and that are drawing on the accumulative experience of our somatically-expressed minds encountering the embodied mind of our parent.

We further maintain that PEM determines, at least to some degree, the parent's capacity to recognise, attend, regulate, or ignore the infant's kinaesthetic expressions of distress and anxiety, as well as those of exuberance, exploration, playfulness, and creativity (Reddy, 2008). Through his or her body, the infant registers the extent to which his or her kinaesthetically manifested mental states have been attended to and, thereby, the extent to which the parent was attuned and responsive to his or her mental world. An interpersonal relationship with a high-PEM parent is likely to imbue the infant with a sense that his or her actions are motivated by mental states and therefore meaningful; that he or she is the agent and owner of his or her body and actions; that mental states, positive and negative, can be shared with others; and that other people can and want to communicate with him or her on a mentalistic level. Such experiences foster a sense of security and trust in the parent.

Conversely, an infant interacting with a parent low on PEM is likely to have his or her mental states ignored, misunderstood, or overridden. Moreover, without parental assistance in making sense of his or her kinaesthetically manifested mental states and thus coming to regard them as meaningful and motivating his or her actions, the infant is likely to have limited access to, and understanding of, the contents of his or her mind; a limited capacity to develop a coherent

representation of his or her mind; and an impaired sense of ownership and agency over his or her embodied mind. Moreover, such an infant is likely to have limited trust in others to be attentive and responsive to his mental states, or trust that his mental experiences can be shared with others. Failure to establish these certainties may eventually lead to the development of insecure attachment (Shai & Belsky, 2011a).

Gergely and Unoka (2008) effectively describe how an ongoing experience with a low-PEM parent may lead to an insecure avoidant attachment representation: for some infants, the activation of the self's basic nonverbal emotional reactions are likely to lead to severe negative consequences for the self in the given attachment context. In such cases, the anticipatory activation of the represented negative consequences exerts a direct and automatic inhibitory effect, blocking the impending motor expression of the activated emotion thereby avoiding the realisation of the anticipated negative consequences. This type of automatic inhibitory "freezing" of the emotion response system is automatic and procedural in nature, leaving the self helplessly overwhelmed by the uncontrolled and continued state of heightened physiological and psychological arousal and stress. Gergely and Unoka (2008) maintain that if such a situation occurs frequently, this emotional coping mechanism can lead not only to deleterious, long-term, toxic consequences, resulting in the development of a rigid and dysfunctional physiological stress-regulation system (Pruessner, Champagne, Meaney, & Dagher, 2004), but also to insecure-avoidant representations of the attachment relationship (Watson, 2001).

Indeed, recent findings show that PEM, measured at 6-months during a free-play interaction at home was predictive of infant attachment security at 15 months. Mothers scoring higher on PEM were significantly more likely to have secure infants than avoidant or resistant infants. This prediction remained when controlling for traditional and robust measures of

parental care, such as maternal sensitivity. In fact, when accounting for maternal sensitivity and PEM in the same model, maternal sensitivity was no longer a significant predictor of attachment security. Interestingly, PEM was not found related to the infant's birth order (that is, maternal experience) or the child's temperament (Shai, in preparation; Shai & Belsky, in preparation).

The infant's internalised representation of the attachment relationship may be considered a multifaceted representation comprised of several developmental achievements established vis-à-vis the parental figure. These achievements include having been treated and responded to as an intentional and mentalistic subjective agent whose affects were attended to and regulated by the parental figure. Together, these experiences contribute to the infant's developing a sense of felt security towards the parent.

### References

- Arnott, B., & Meins, E. (2007). Links between antenatal attachment representations, postnatal mind-mindedness, and infant attachment security: A preliminary study of mothers and fathers. *Bulletin of the Menninger Clinic, 71*, 132-149.
- Beebe, B. (2000). Co-constructing Mother-Infant Distress: The ,microsynchrony of maternal impingement and infant avoidance in the face-to-face encounter. *Psychoanalytic Inquiry, 20*, 421-441.
- Beebe, B., Jaffe, J., Lachmann, F., Feldstein, S., Crown, C., & Jasnow, M. (2000). Systems models in development and psychoanalysis: The Case of vocal rhythm coordination and attachment. *Infant Mental Health Journal, 21*, 99-122.
- Beebe, B., Jaffe, J., Markese, S., Buck, K., Chen, H., Cohen, P., Bahrnick, L., Andrews, H., & Feldstein, S. (2010). The origins of 12-month attachment: A microanalysis of 4-month

- mother-infant interaction. *Attachment & Human Development*, 12, 1-13.
- Beebe, B., Lachmann, F. M., & Jaffe, J. (1997). Mother-infant interaction structures and presymbolic self- and object representations. *Psychoanalytic Dialogues*, 7, 133-182.
- Blatt, S. J., & Luyten, P. (2009). A structural-developmental psychodynamic approach to psychopathology: two polarities of experience across the life span. *Development and Psychopathology*, 21, 793-814.
- Bowlby, J. (1973). *Attachment and loss. Vol. 2: Separation: Anxiety and anger*. New York: Basic Books.
- Bretherton, I. (1985). Attachment Theory: Retrospect and Prospect. *Monographs of the Society for Research in Child Development*, 50, 3-35.
- Cicchetti, D., & Rogosch, F. (1996). Equifinality and multifinality in developmental psychopathology. *Development and Psychopathology*, 8, 597-600.
- Crittenden, P. M. (1990). Internal representational models structures of attachment relationships. *Journal of Infant Mental Health*, 11, 259-277.
- Emde, R. N. (1988). Development terminable and interminable: I. Innate and motivational factors from infancy. *International Journal of Psychoanalysis*, 69, 23-42.
- Evans, C. A., & Porter, C. L. (2009). The emergence of mother-infant co-regulation during the first year: Links to infants' developmental status and attachment. *Infant Behavior and Development*, 32, 147-158.
- Feldman, R. (2007). On the origins of background emotions: From affect synchrony to symbolic expression. *Emotion*, 3, 601-611.
- Fonagy, P., Gergely, G., Jurist, E. L., & Target, M. (2002). *Affect regulation, mentalization, and the development of the self*. London: Karnac.

- Fonagy, P., Gergely, G., & Target, M. (2007). The parent–infant dyad and the construction of the subjective self. *Journal of Child Psychology and Psychiatry*, 48, 288-328.
- Fonagy, P., Redfern, S., & Charman, T. (1997). The relationship between belief–desire reasoning and a projective measure of attachment security (SAT). *British Journal of Developmental Psychology*, 15, 51-61.
- Fonagy, P., Steele, M., Steele, H., Leigh, T., Kennedy, R., Mattoon, G., et al. (1995). Attachment, the reflective self, and borderline states: The predictive specificity of the Adult Attachment interview and pathological emotional development. In S. Goldberg, R. Muir & J. Kerr (Eds.), *Attachment theory: Social, developmental and clinical perspectives* (pp. 233-279). Hillsdale, NJ: Analytic Press.
- Fonagy, P., & Target, M. (1997). Attachment and reflective function: Their role in self-organization. *Development and Psychopathology*, 9, 679-700.
- Fonagy, P., & Target, M. (2007). The rooting of the mind in the body: New links between attachment theory and psychoanalytic thought. *Journal of the American Psychoanalytic Association*, 55, 411-456.
- Freud, S. (1917). Mourning and melancholia *Standard Edition*, 14 (pp. 243-248). London: Hogarth Press, 1957.
- Gallese, V. (2006). Intentional attunement: A neurophysiological perspective on social cognition and its disruption in autism. *Brain Research*, 1079, 15-24.
- Gergely, G., & Unoka, Z. (2008). Attachment, affect-regulation and mentalization: The developmental origins of the representational affective self. In C. Sharp, P. Fonagy, & I. Goodyer (Eds.), *Social cognition and developmental psychopathology* (pp. 303-340). Oxford, UK: Oxford University Press.

- Hertenstein, M. J. (2002). Touch: Its communicative functions in infancy. *Human Development*, 45, 70-94.
- Hesse, E. (2008). The Adult Attachment Interview: Protocol, method of analysis, and empirical studies. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2<sup>nd</sup> edition, pp. 552-598). New York: Guilford Press.
- Kestenberg, J. S. (1965). The role of movement patterns in development. I. Rhythms of movement. *Psychoanalytic Inquiry*, 34, 1-36.
- Keysers, C., & Gazzola, V. (2006). Towards a unifying neural theory of social cognition. *Progress in Brain Research*, 156, 383-406.
- Keysers, C., & Gazzola, V. (2007). Integrating simulation and theory of mind: From self to social cognition. *Trends in Cognitive Sciences*, 11, 194-196.
- Krueger, D. W. (1989). *Body Self and Psychological Self*. New York: Bruner/Mazel.
- Laban, R., & Lawrence, F. C. (1947). *Effort: A system analysis, time motion study*. London: MacDonald & Evans.
- Lambie, J. A. (2009). Emotion experience, rational action, and self-knowledge. *Emotion Review*, 1, 272-280.
- Ledoux, J. E. (2002). *The synaptic self: How our brains become who we are*. New York: Viking.
- Lewkowicz, D. J., & Turkewitz, G. (1980). Cross-modal equivalence in early infancy: Auditory-visual intensity matching. *Developmental Psychology*, 16, 597-607.
- Meins, E. (1999). Sensitivity, security, and internal working models: Bridging the transmission gap. *Attachment & Human Development*, 1, 325-342.
- Malloch, S. (1999). Mothers and infants and communicative musicality. *Musicae Scientiae*, 29-57.



- Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion, 27*, 77-102.
- Modell, A. (1992). *The private self in public space*. Cambridge, MA: Harvard University Press.
- Mondloch, C. J., & Maurer, D. (2004) Do small white balls squeak? Pitch-object correspondences in young children. *Cognitive, Affective, and Behavioral Neuroscience, 4*, 133-136.
- Oppenheim, D., Koren-Karie, N., & Sagi, A. (2001). Mother's insightfulness of their preschoolers' internal experience: Relations with early attachment. *International Journal of Behavioral Development, 25*, 16-26.
- Orbach, S. (2004). The body in clinical practice: There's no such thing as a body. In K. White (Ed.), *Touch: Attachment and the body* (pp. 17-34). London: Karnac.
- Pipp, S. (1990). Sensorimotor and representational internal working models of self, other and relationship: Mechanisms of connection and separation. In D. C. M. Beeghly (Ed.), *Topics in transition in development: Self-development* (pp. 243-264). Chicago, IL: University of Chicago Press.
- Pruessner, J. C., Champagne, F., Meaney, M. J., & Dagher, A. (2004). Dopamine release in response to a psychological stress in humans and its relationship to early life maternal care: a positron emission tomography study using <sup>11</sup>C raclopride. *Journal of Neuroscience, 24*, 2825-2831.
- Reddy, V. (2008). *How infants know minds*. Cambridge, MA: Harvard University Press.
- Rochat, P. (in press). Me and mine in early development. In T. Fuchs (Ed.), *DISCOS conference volume on Disorders and Coherence of the Embodied Self*.

- Schore, A. (2003). *Affect regulation and the repair of the self*. New York: Norton.
- Shai, D. (2010). Introducing parental embodied mentalising: Exploring moments of meeting of mind of parent and infants from a relational whole-body kinaesthetic perspective. In S. Bender (Ed.), *Movement analysis of interaction* (pp. 107-124). Berlin: Logos Verlag.
- Shai, D. (in preparation). *Embodied attachment: Parental embodied mentalising predicts attachment security over and above maternal sensitivity*.
- Shai, D., & Belsky, J. (2011a). When words just won't do: Introducing parental embodied mentalising. *Child Development Perspectives*, 5, 173-180.
- Shai, D., & Belsky, J. (2011b). Parental embodied mentalising: Let's be explicit about what we mean by implicit. *Child Development Perspectives*, 5, 187-188.
- Shai, D., & Belsky, J. (in preparation). *Embodied attachment: Parental embodied mentalising at six months predicts an array of developmental outcomes at 54 months*.
- Sharp, C., & Fonagy, P. (2008). The parent's capacity to treat the child as a psychological agent: Constructs, measures and implications for developmental psychopathology. *Social Development*, 17, 737-754.
- Slade, A. (2002). Keeping the baby in mind: A critical factor in perinatal mental health. *Zero to Three*, 10-16.
- Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment and Human Development*, 7, 269-281.
- Slade, A. (2006). Reflective parenting programs: Theory and development. *Psychoanalytic Inquiry*, 26, 640-657.
- Stern, D. N. (1977). *The First relationship*. Cambridge, MA: Harvard University Press.
- Stern, D. N. (1985). *The interpersonal world of the infant*. London: Karnac.

- Stern, D. N. (2002). *The first relationship: Infant and mother*. Cambridge, MA: Harvard University Press.
- Stolorow, R., & Atwood, G. (1992). *Contexts of being: The intersubjective foundations of psychological life*. Hillsdale, NJ: The Analytic Press.
- Trevarthen, C. (1977). Descriptive analyses of infant communicative behaviour. In H. R. Schaffer (Ed.), *Studies in mother-infant interaction* (pp. 227-270). London: Academic Press.
- Trevarthen, C. (2008). The musical art of infant conversation: Narrating in the time of sympathetic experience, without rational interpretation, before words. *Musicae Scientiae*, 11-37.
- Trevarthen, C. (2004). Intimate contact from birth: How we know one another by touch, voice, and expression in movement. In K. White (Ed.), *Touch: Attachment and the body* (pp. 1-16). London: Karnac.
- Trevarthen, C., & Aitken, K. J. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *Journal of Child Psychology and Psychiatry*, 42, 3-48.
- Tronick, E. Z. (1989). Emotions and emotional communication in infants. *American Psychologist*, 44, 112-119.
- Tronick, E. Z. (2003). Of course all relationships are unique: How co-creative processes generate unique mother–infant and patient–therapist relationships and change other relationships. *Psychological Inquiry*, 23, 473-491.
- Tronick, E. Z. (2005). Why is connection with others so critical? The formation of dyadic states of consciousness: Coherence governed selection and the co-creation of meaning out of messy meaning making. In J. Nadel & D. Muir (Eds.), *Emotional development* (pp. 293-315). Oxford, UK: Oxford University Press.

- Tronick, E. Z. (2007). *The neurobehavioral and social-emotional development of infants and children*. New York: Norton.
- Tronick, E. Z., Als, H., & Adamson, L. (1979). The structure of early face-to-face communicative interactions. In B. M. XXX (Ed.), *Before speech: The beginning of interpersonal communication* (pp. 349-372). Cambridge: Cambridge University Press.
- Tronick, E. Z., Als, H., & Brazelton, T. (1977). Mutuality in mother-infant interaction. *Journal of Communication, 27*, 47-79.
- Watson, J. S. (2001). Contingency perception and misperception in infancy: Some potential implications for attachment. *Bulletin of the Menninger Clinic, 65*, 296-321.
- Watson, J. S., Futo, J., Fonagy, P., & Gergely, G. (2010). Gender and relational differences in sensitivity to internal and external cues at 12 months. *Bulletin of the Menninger Clinic, 75*, 64-93.
- Weinberg, M. K., & Tronick, E. Z. (1994). Beyond the face: An empirical study of infant affective configurations of facial, vocal, gestural, and regulatory behaviors. *Child Development, 65*, 1503-1515.
- Winnicott, D. W. (1949). Mind and its relation to the psyche-soma. In *Collected papers: Through Pediatrics to Psycho-Analysis* (pp. 243-254). London: Tavistock.