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SYMPOSIUM ON INTERSUBJECTIVITY IN INFANT RESEARCH AND ITS IMPLICATIONS
FOR ADULT TREATMENT, PART I

An Expanded View of Intersubjectivity in Infancy and its Application to Psychoanalysis

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We consider the relevance of forms of intersubjectivity in infancy to the nonverbal and implicit dimension of intersubjectivity in psychoanalysis. The term forms of intersubjectivity, within the adult explicit and implicit modes and the infant presymbolic implicit mode, is offered to clarify the multiple meanings of intersubjectivity. The ideas of infant intersubjectivity of Meltzoff, Trevarthen, and Stern that have particular relevance for psychoanalysis are highlighted: the dialogic origin of mind, the role of correspondences, and the idea that symbolic

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forms of intersubjectivity are built on presymbolic forms. We build on their work to define a fourth position: that the full range of patterns of interactive regulation provides the broadest definition of the presymbolic origins of intersubjectivity, with correspondence being only one of many critical patterns. We additionally address the place of interactive regulation, problems with the concept of matching, the role of self-regulation, the role of difference, and the “balance model” of self- and interactive regulation. We take the position that all forms of interactive regulation are relevant to the possibility of perceiving and aligning oneself with the moment-by-moment process of the other. A broadened understanding of intersubjectivity in infancy sets the stage for a more fruitful exchange between infant researchers and psychoanalysts.

IN THIS PAPER WE CONSIDER THE RELEVANCE OF FORMS OF INTERSUBJECTIVITY in infancy to psychoanalysis. Our working assumption is that modes of preverbal communication documented in infant research can, by analogy, describe modes of “nonverbal”¹ and implicit communication in adult treatment (see Lachmann and Beebe, 1996; Schore, 1997; Beebe and Lachmann, 1998, 2002; Lyons-Ruth, 1998, 1999; Stern et al., 1998; Pally, 2000). These modes of communication tend to be implicit, operating largely out of awareness (Pally, 1997a, b; Lyons-Ruth, 1998). Our intention is to explicate as well as to critique infant intersubjectivity and its relevance to psychoanalysis. Whereas Meltzoff, Stern, and Trevarthan have used infant research to define correspondence as the core of intersubjectivity in infancy, we build on their work to define a fourth position. Using a more neutral definition of intersubjectivity as referring to what is occurring between two minds, rather than a more positive definition implying mutuality, we argue that the full range of patterns of interactive regulation provides the broadest definition of the presymbolic origins of intersubjectivity, with correspondence being only one of many critical patterns. In addition we address the place of interactive regulation, problems with the concept of matching, the role of self-regulation, the role of difference, and the “balance model” of self- and interactive regulation. All forms of interactive regulation are relevant to the possibility of perceiving and aligning oneself with the moment-by-

¹The use of the term *nonverbal* is discussed in Paper I.



moment process of the other. A broadened understanding of intersubjectivity in infancy sets the stage for a more fruitful exchange between infant research and psychoanalysis. Paper IV applies these concepts to an adult treatment case.

Contributions of Meltzoff, Trevarthen and Stern Relevant to Psychoanalysis

One central arena in which infant research *can* make an important contribution to forms of intersubjectivity in psychoanalysis is the appreciation of correspondences and matching, through the work of Meltzoff, Trevarthen and Stern. First we address two key ideas important for psychoanalysis that the three infancy theorists share: the dialogic origin of mind and the power of correspondences in preverbal communication. We then pursue specific contributions of each of the theorists.

Shared Contributions of Meltzoff, Trevarthen, and Stern

Dialogic Origin of Mind

Meltzoff, Trevarthen, and Stern all endorse the position that mind begins as shared mind. An infant has multiple ways of sensing the state and process of the other in the early months of life. The origin of mind is seen as dyadic, dialogic, and (presymbolically) representational. This position has major implications for psychoanalytic theory: the organization of experience begins as dyadic and dialogic. In psychoanalysis, the origin of mind has generally been based on reconstruction of what the adult patient might have experienced. The origin of mind has often been conceptualized within a one-person model, as an isolated mind, an autistic mind, or, in other metaphors, as a reflex arc or a seething cauldron, rather than as a dyad in dialogue. Once shared mind is posited as the point of origin, the entire psychoanalytic theory of development shifts. The dyadic, dialogic origin of mind has much in common with Balint's (1992) primary object love, Bowlby's (1969) attachment model, and Sullivan's (1953) view of affect contagion in infancy. It is consistent with the position of relational theorists (Aron, 1996; Mitchell, 2000) that adult mind is dyadic and interactional, and with Stolorow and Atwood's (1992)



“myth of the isolated mind,” although the focus of these adult theorists is not on the *origin* of mind. Infant research adds to these psychoanalytic theories, however, by describing the early complexity of the dialogic exchange, based on a far more sophisticated infant presymbolic intelligence than was ever imagined.

This position of the dialogic origin of mind is also consistent with that of two major thinkers of the 20th century, Mikhail Bakhtin in literature and Charles Taylor in philosophy. Bakhtin (1981; see also McCrorie, 2000) argued that nonverbal exchanges can be dialogical. He distinguished ordinary dialogue from “dialogic relations,” which are broader, more diverse, and more complex. Even a monologue, in Bakhtin’s view, implies a listener. Taylor (1991) has argued specifically for the dialogic origin of mind:

The general feature of human life that I want to evoke is its fundamentally dialogical character. We become full human agents . . . through our acquisition of rich human languages of expression. . . . I want to take “language” in a broad sense, covering not only the words we speak but also other modes of expression . . . including the languages of art, of gesture. . . . But we are inducted into these . . . through exchanges with others who matter to us. . . . The genesis of the human mind is in this sense not “monological,” . . . but “dialogical.” . . . the making and sustaining of our identity . . . remains dialogical throughout our lives [pp. 34–35].

The Power of Correspondences

All three infancy theorists concur that correspondences, matching, and similarities are an extremely powerful, fundamental aspect of preverbal communication and promote the possibility of “shared mind.” Moreover, Meltzoff (see Meltzoff and Moore, 1998) and Trevarthen (1998) concur that even newborns are sensitive to corresponding movements and expressions in the human partner through temporal and morphological markers, hence, an intersubjective newborn. The range of meanings given to matching and correspondence by the three theorists, as reviewed in Paper II, speaks to the complexity of the concept and the nuances of nonverbal communication that can be communicated through various forms of matching. This theme of correspondence and matching is not salient in psychoanalysis, which tends to focus on differentiation, disruption, and conflict. The



importance of similarities and correspondences has not received equal play as a means of sensing and entering the other's process, a way of communicating to the other a feeling of "being with," and as a fundamental ingredient of intimacy.

Why is matching so important? The capacity to perceive what is familiar, what repeats, and what is invariant is a central principle of early cognitive development, as well as neural functioning (Bornstein, 1985). By being able to perceive difference as well as similarity, infants select similarities, extract invariances, and use this information to form categories that, when generalized, form the basis of presymbolic representation. The ability to abstract common properties among discriminable entities and to generalize on the basis of that abstraction is fundamental to adult forms of representation as well (Bornstein, 1985; Stern, 1985; Walton and Bower, 1993).

The discussions of correspondence and matching by the infant theorists can provide psychoanalysis with detailed ways of conceptualizing how each person senses the state and moment-by-moment process of the other in the nonverbal and implicit realm. Trevarthen's (1998) description of patterns of movement transferred from subject to subject by way of form, timing, and intensity provides a specificity that is very useful for conceptualizing how one person senses the state of the other. Stern's (1985) description of *changing with* the other, through micromomentary shifts in intensity over time that allow us to feel what has been perceived in the other, further elaborates the process by which each person comes to sense the process of the other. These forms of similarity form the bedrock of experiences of "you are with me; you are on my wavelength."

Of the adult theorists of intersubjectivity described in Paper I, Stolorow and colleagues (Stolorow and Atwood, 1992; Stolorow, Atwood, and Brandchaft, 1994) come closest to the use of correspondences in their concept of affect attunement; but this term is used by Stolorow and colleagues in a very general way, to convey optimal empathic responsiveness, without the specificity of Stern's (1985) definition of attunement as cross-modal matching of timing, form, and intensity and the power of Stern's (1985) concept of "changing with." Ogden's (1986, 1989, 1994) theory is critically dependent on the analyst's personal reverie as a way of inferring the inner state of the patient. Both Trevarthen's and Stern's descriptions of how this sensing of the other occurs might elucidate *how* the patient influences Ogden's reverie.



Furthermore, all three infancy theorists point out the special motivational significance of correspondences in organizing dyadic experiences of exuberance, playfulness, and enjoyment. Tronick (1998) suggests that these experiences lead to expanded dyadic states of mind. Still, the idea that correspondence and matching might organize experiences of exuberance, playfulness, and dyadic expansion is not salient in psychoanalysis (for an exception see Winnicott, 1965). Stern (1985) is the most articulate about the importance of these matching experiences for bonding, attachment and intimacy. This is a powerful but neglected theme for adult forms of intersubjectivity. All the infant theorists and none of the adult theorists emphasize the powerful positive emotional experiences made possible by various forms of matching. Experiences of exuberance in the psychoanalytic dyad are an important but neglected source of therapeutic action

Specific Contributions of Meltzoff

Of the three theorists, Meltzoff is the one whose experiments have documented a rudimentary form of representational intelligence in the early weeks and months of life (see Paper II). In the experiments on infant imitation 42 minutes after birth, Meltzoff (Meltzoff and Moore, 1998) holds that the infant is comparing his own action, such as mouth opening, against an internal memory, schema, or representation of the action of mouth opening that he saw the model make. Furthermore, the infant's capacity to use cross-modal correspondences to match the actions of the model enables the infant to apprehend that the partner is similar to the self: in essence, in a presymbolic format, "You are like me." By six weeks, the infant can observe the model one day and then return 24 hours later and imitate the action. Meltzoff's work offers a radical change in the way we conceptualize the origin of mind in psychoanalysis. Far earlier than we thought, there is a rudimentary capacity to represent, and to match, the behavior of another person. As noted in Paper II, this capacity may be based on "mirror neurons."

Meltzoff's work is potentially relevant to psychoanalysis in a second way. Seeing oneself in the actions of the other, or recreating the other's actions in the self, can be seen as the reason why mirroring experiences are so powerful. The capacity to detect that "You are like me," or to reproduce the other's behavior so that "I am like you," is a primal organizing theme of preverbal intersubjectivity. These experiences



contribute to feeling “known” or “on the same wavelength” (see Beebe and Lachmann, 1988). This concept is illustrated through a psychoanalytic case in Paper IV. Benjamin’s (1988, 1992, 1995) theory includes Meltzoff’s concept that “You are like me” as an independent agent or subject. She makes the point that this process ultimately contributes to the formation of identifications.

Finally, Meltzoff’s (1985) work on the cross-modal perception of correspondence illustrates one mechanism for the coordination of inner and relational states (see Beebe and Lachmann, 1998). Through cross-modal matching from the beginning of life, the infant translates between environmental information and inner proprioceptive information. He can thus bring his internal state and behavior into a correspondence with the behavior of the partner. (Stern’s (1985) theory of cross-modal matching is similar, but in it the relevance of this matching for intersubjectivity begins toward the end of the first year, not at birth). Ekman (1983) has made an argument for adults similar to that of Meltzoff for neonates. Meltzoff (1985; Meltzoff and Moore, 1998) this cross-modal matching at birth provides a fundamental relatedness between self and other, between inner state and environment. Although Meltzoff’s demonstration is in the modality of facial expression, this principle can be extended to other modalities, such as correspondences of timing (see Beebe et al., 1985; Beebe et al., 2000; Jaffe et al., 2001). In the psychoanalytic dyad, cross-modal correspondences enable either patient or analyst to bring internal process (or state) and behavior into a correspondence with the internal process and behavior of the partner. Presumably these correspondences are created largely out of awareness and are subject to the multiple vicissitudes of transferences of both analyst and patient.

Specific Contributions of Trevarthen

Whereas Meltzoff conceptualizes the representational newborn Trevarthen (1993, 1998) conceptualizes the dialogic newborn, in a reciprocally communicative dyad (see Paper II). Trevarthen’s description of the emotional newborn as participating in protoconversation goes a step beyond Meltzoff to an inherently dyadic, dialogic mind. Trevarthen extends Meltzoff’s imitation argument into a more general statement that human sympathetic consciousness is not an acquired skill but, rather, an innate ability that allows *both* infant and caretaker to be in immediate sympathetic contact, each



aware of the other's feelings and purposes without words and language, by matching communicative expressions through time, form, and intensity. This matching regulates both interpersonal contact and inner state. This position is consistent with, but deepens, the contemporary view that adult mind is dyadic and organized in interaction (see, for example, Stolorow and Atwood, 1992; Aron, 1996; Mitchell, 2000). If dialogic communication is an innate capacity of the infant perhaps it remains a lifelong resource that can be tapped when later aspects of development fail. This position is illustrated by the treatment case described in Paper IV.

Both Trevarthen (1974, 1977, 1979, 1993, 1998) and Stern (1971, 1977, 1985) have been influential in formulating a mutual, bidirectional regulation model of communication (see also, Beebe and Stern, 1977; Beebe, Jaffe and Lachmann, 1992; Gianino and Tronick, 1988; Jaffe and Feldstein, 1970; Tronick, 1989, 1998; Sander, 1977, 1995). Trevarthen (1993, 1998) suggests that the capacity for the mutual regulation of joint action is available from birth. Mutual regulation is based on each partner's ability to detect that the other's behavior is contingent on his own actions, and vice-versa. Positioning mutual regulation as a capacity available from the beginning of life is an essential corollary of Trevarthen's dyadic/dialogic mind at birth. Although mutual regulation is endorsed in varying ways by all the adult psychoanalytic theorists described in Paper I, as well as by current relational theorists (see especially Aron, 1996), the position that mutual (bidirectional) regulation is a central aspect of communication from birth again deepens and extends current psychoanalytic views. Mutual regulation becomes a primary organizing principle of all communication and development.

Although all three infancy theorists would agree that early communicative competence is more fundamental than language, Trevarthen is the most explicit on this point. Following Habermas (1997) and Ryan (1974), Trevarthen (1993a, b, 1998) holds that *linguistic forms of intersubjectivity have their foundation in prelinguistic forms; that intersubjectivity is initially preverbal and dialogic*. Trevarthen's view provides the psychoanalytic dyad with a foundation of communication that initially precedes language, eventually runs parallel to language, and can potentially influence and be influenced by language. The description of the prelinguistic origins of communicative competence is one of the most important contributions



of the infant theorists of intersubjectivity. One implication for psychoanalysis is that, when language fails, the psychoanalytic dyad can still have access to prelinguistic and implicit forms of communicative competence and intersubjectivity, as illustrated in Paper IV. A second implication is that *all linguistic forms of intersubjectivity continue to depend on pre- or nonlinguistic forms*. This second point suggests that all psychoanalytic treatments are dependent on pre- and nonlinguistic forms of communicative competence and intersubjectivity, not just those of more disturbed patients.

Of the three theorists, Trevarthen (1993a, b, 1998) is unique in proposing that coupling rhythms is the key mechanism explaining how the matching of communicative expressions works. He hypothesizes that infant and adult coordination of behaviors depends on a common beat, based on coupled neural oscillators, assisted by mutual imitation and matching. A considerable number of infant as well as adult researchers concur with Trevarthen that rhythmic coordination is a fundamental organizing principle of communication (see for example Jaffe and Feldstein, 1970; Cappella and Planalp, 1981; Beebe et al., 1985; Warner et al., 1987; Warner, 1988a, b; Badalamenti and Langs, 1990; Cappella, 1991; Crown, 1991; Jaffe et al., 2001). Rhythmic coordination can occur in any modality, such as vocal, facial, gazing patterns and body movement. In mother–infant treatments, when the infant does not look, or is limp and shut down, subtle forms of rhythmic coordination with sounds or movements remain ways of reaching the infant (Beebe, 2003). A similar concept is illustrated in the adult treatment discussed in Paper IV.

Striking similarities in the timing and rhythmic coordination of the communicative process across the life span underscore the importance of Trevarthen's position that rhythmic coupling is a key mechanism for the matching and correspondences of intersubjectivity in infancy (see Beebe et al., 1985). Trevarthen et al. (1999) give the example of infant finger movements synchronized with the end of melodic phrases, as if the infant were conducting. Another example comes from work on vocal rhythms, where mothers and infants regulate the exchange of turns in much the same way as do adults (Beebe, et al., 1985; Beebe et al., 1988; Jaffe et al., 2001). A "switching pause" is the momentary silence that occurs at the point of the turn exchange, and this pause is matched (correlated) in both adult–adult and infant–adult vocal exchanges. Each person can anticipate how long to wait before taking



a turn. Matching the duration of the switching pause is a cornerstone of adult dialogue and turntaking, allowing a graceful exchange of turns. In adult conversation, if the switching pause is too short, or nonexistent, the person is experienced as “rude.” Persons who talk on endlessly, without allowing the other a turn, may be experienced as *not recognizing* the partner. The dialogic turn-taking structure of conversation is disturbed in such persons. Conversely, if the switching pause is too long, the person may be experienced as “out to lunch,” not paying attention, “not with me.” It is remarkable that four-month-old infants with their mothers show this aspect of the regulatory structure of adult dialogue. In this sense, language is built on the scaffolding of earlier coordination of communication rhythms (Beebe et al., 1988).

Badalamenti and Langs (1990) linked different vocal rhythm patterns in adult patient–therapist pairs to depth of narrative imagery, a measure developed by Bucci (1997). Instead of waiting for the switching pause, therapists tended to interrupt more when patients used less narrative imagery. In contrast, low interruption by therapists, but not low speech rate, was associated with the highest therapist vocal rhythm influence on patients’ vocal rhythms. High narrative imagery in the patients was associated with less therapist interruption, longer therapist silences (but not lower overall speech rate), and high amounts of “back-channelling” (umm, huh) which kept the ongoing beat of the patients’ speech. This research by Badalamenti and Lang’s (1990) illustrates how important are variations in the coordination of vocal rhythms to any treatment (see also Holtz, 2003). Knoblauch (1997, 2000), describing the role of rhythm in therapeutic dialogue, has illustrated both matching and violations of rhythmic patterns. Beebe (1999) used matching of rhythms of whimper and cry sounds as a way of making contact with a female patient sitting up in analysis who cried most of the time and who was not able to talk or look at the therapist. Coupling of rhythms is thus an important organizing principle in psychoanalytic communication.

Specific Contributions of Stern

Unlike Trevarthen, who has formulated all his work within a theory of infant intersubjectivity, Stern’s (1985, 1989, 1994, 1995; Stern et al., 1998) contributions to psychoanalysis are much broader than his theory of intersubjectivity. Perhaps Stern’s most fundamental



contribution is to bring infant research into a prominent place within psychoanalysis. Nevertheless we are limiting our discussion here to the relevance of Stern's theory of intersubjectivity. We do not address Stern's later work with the Boston Study Group on Change (Stern et al., 1998).

The concept of matching has been greatly expanded by Stern. His formulation of matching as "changing with" is fundamentally dyadic and moves the concept into a "process" model. By contrast, Stern and colleagues (1985) critique the model of matching as imitation. Imitation is a static concept describing a particular moment in time, in which one person matches another, rather than an ongoing, two-way communicative process. Stern and his colleagues describe "changing with" as "dynamic micro-momentary shifts in intensity over time that are perceived as patterned changes within ourselves and others" that allow us, automatically and without awareness, to "change with" the other, to "feel-what-has-been-perceived-in-the-other" (p. 263). This is an invaluable concept for psychoanalysis. It provides a key way of tracking the moment-by-moment, dyadic, nonverbal process. The focus on slight *shifts in intensity in both partners* is a fine-grained way of being in the fluctuations of the "moment," where subtle gradient changes within an affect category are more likely than a change of affect category. A further aspect of Stern's description of "changing with" is the notion of "share without altering." This, too, is a powerful concept for psychoanalysis, which we illustrate later with an example of entering the distress state of the other, as well as in the treatment case in Paper IV.

Stern's (1985) emphasis on changing with shifts of intensity or *level of activation* (also key in Trevarthen's (1993, 1998) theory) has received independent support from the work of Jaffe et al. (2001) on the coordination of mother-infant, as well as adult (mother-stranger), vocal rhythms. The most pervasive pattern in the data is a correspondence between the two partners in level of activation of vocal rhythms (a correlation of the ratio of sound to silence, within any sound-silence cycle, across the group). By contrast, matching the beat (a correlation of the average duration of the sound-silence cycle) is a rare pattern in the Jaffe et al. (2001) data. Level of activation is continuously shifting in both partners: as one partner shifts the level of intensity up or down, the partner does so as well. The concept of matching level of activation provides psychoanalysis with another subtle means of tracking and reaching the partner.



A second way in which Stern (1985) expands the concept of matching is his central criterion for affect attunement that the *inner* state of the partner, rather than the overt behavior itself, becomes the referent for the match. Although Trevarthen (1993, 1998) also argues that matching of patterns of movement permits intercoordination of inner states between partners, for Stern this idea becomes more central and importantly different. Stern argues that the same level of exuberance can be expressed as, for example, a facial expression, a gesture, or a vocalization. Cross-modal matching of behavior, through nonverbal analogy and metaphor, recasts the experience of emotional resonance into a quality of feeling or inner state that Stern (1985) terms “forms of feeling.” Forms of feeling become the referent for what is matched, ultimately facilitating symbolization. For Stern, affect attunement provides a bridge from the presymbolic to the symbolic mind. Affect attunement is thus very different from the kinds of matching and correspondences discussed by Meltzoff and Trevarthen (see Paper II) and it defines a *critical reorganization of intersubjectivity* toward the end of the first year. This theory makes an important contribution to our understanding of the origins of symbolic forms of representation of feeling.

Stern (1985) suggests that experiences that are attuned to define what is shareable, what can be validated; experiences that are not attuned to define what cannot be validated about the self, potential “not-me” experiences. This element of Stern’s theory has a strong parallel in Winnicott’s (1965) concept of the “not-me” experience. It is also paralleled in Stolorow and Atwood’s (1992) concept of “the unvalidated unconscious:” affects that were never validated by the caregiver become the source of vague, diffuse, unsettling feelings and sensations that do not become shareable and thus do not become integrated into the self. Stern’s concept, however, carries the further implication that “not-me” experiences can derive from *nonverbal or implicit* forms of failures of validation.

As important as the concept of affect attunement is for psychoanalysis, it is easily misunderstood. It is often used synonymously with empathy, which Stern (1985) explicitly rejects, as discussed in Paper II. The central criteria of Stern’s concept of affect attunement—a cross-modal matching of timing, form, and intensity; a matching of forms of feeling rather than behaviors; and a matching of micromomentary shifts in intensity over time—are lost in most psychoanalytic discussions of affect attunement.



Matching versus the Full Complexity of Preverbal Communication

In addressing the relevance of infant research for theories of intersubjectivity in adult psychoanalysis, Meltzoff, Trevarthen, and Stern provide a critical foundation. Apart from Stern's (1985) notion of attunement, it is striking that many of their ideas have not been used in psychoanalytic discussions of intersubjectivity. However, their reliance on the concept of matching/correspondence does not encompass the full complexity of the preverbal construction of experience. Nor is the concept of matching/correspondence sufficiently broad to explicate the relevance of other important infant research findings for theories of intersubjectivity in psychoanalysis. Correspondences can be seen as a focal point in a broader field of the complex structure of preverbal relatedness. In this section we build on and expand Meltzoff, Trevarthen and Stern, developing a fourth position on the meanings of forms of intersubjectivity in infancy. Although other dimensions of preverbal interactions could well be addressed, we draw from research on face-to-face interaction and suggest that the following issues require clarification and elaboration: problems with the concept of matching, the role of difference, the place of interactive regulation, and the role of self regulation. We close with the "balance model" of self and interactive regulation, which integrates these issues.

Difficulties with the Concept of Matching

Matching alone does not characterize mother–infant interactions in the first half-year (Cohn and Tronick, 1989; Malatesta et al., 1989; Tronick, 1989). Instead, similarities as well as differences characterize the interaction. By focusing on the perception of correspondence and matching as the key to presymbolic intersubjectivity, overall the three infant theorists tend to ignore issues of difference, even though an infant's capacity to perceive differences is equally developed. For example, DeCasper and Carstens (1980) showed that newborns perceive violations in an expected pattern and show signs of affective distress following the violation. The one exception to this critique is Stern et al.'s (1985) demonstration that infants perceive experimental maternal mismatches, and these mismatches disrupt the infant's ongoing play.



In Tronick's (1989) view, the concept of matching has been romanticized. In Tronick and Cohn's (1989) research, mothers and infants matched engagement (for example, mutual visual focus on the partner's face, mutual positive faces, or mutual focus on an object) only about one third of the time. Malatesta et al. (1989) have similar data, showing that mother and infant tend to match facial expression about one third of the time. Instead of thinking of matching per se, Tronick and Cohn (1989) suggest that we conceptualize a more flexible interactive process: match, mismatch, rematch. The Tronick and Cohn data show that, in general, given a mismatch (for example, mother with smiling face but infant neutral face), mothers and infants tended to rematch (both partners with positive face) within two seconds. Furthermore, a greater likelihood of rematch within two seconds is associated with a greater probability of secure attachment at one year (Tronick, 1989). The critical issue is "interactive repair," the ability of the dyad to rematch, which has been framed as a disruption and repair process (Beebe and Lachmann, 1994). Using this perspective, rematch following mismatch may be even more important than matching.

The meanings of matching are complex and encompass both "similarity" and "compensatory" forms. Matching is frequently assessed through correlational techniques, where the sign can be positive or negative. For example, in the data on mother–infant vocal rhythm matching (see Beebe, Lachmann, and Jaffe, 1997; Beebe and Lachmann, 1988; Jaffe et al., 2001), when the sign is positive, as one person increases the duration of a behavior, the partner follows suit: a "similarity" form of matching. Illustrating a "similarity" form of matching, the switching pause tends to be coordinated with a positive sign so that, at the point of the exchange, both mother and infant wait for a similar duration, thus making the turn exchange more predictable. This finding also characterizes adult conversation (Jaffe and Feldstein, 1970; Feldstein and Welkowitz, 1978; Crown, 1991).

In contrast, when the sign is negative, as one person increases the duration of a behavior, the partner systematically decreases the duration: a "compensatory" form of matching. In the vocal rhythm data of Jaffe et al. (2001), vocalizations and pauses tend to be coordinated between partners with a negative sign, which results in a homeostatic "balancing": as one partner's degree of coordination is tighter, the other's is looser, and vice-versa, so that between the two a



more constant activity level is maintained. This mode of coupling constitutes a dyadic regulation of relative tightness of coordination within the turn. Turn-taking is facilitated by this mode of rhythmic coupling in the sense that each partner has a model of how to act during his turn: to become more or less coordinated, to move in, or to back off. Here, rather than keeping the behavior similar, as in the switching-pause match, the task seems to be keeping a relatively constant dyadic degree of activation across both partners' turns (see Beebe et al., 1985; Beebe and Lachmann, 1998). The positive and negative signs of the coordination define two modes of rhythmic coupling (see Jaffe et al., 2001). The former mode of coupling amplifies dyadic deviations through positive feedback, whereas the latter counteracts deviations, resulting in a more constant dyadic activity level.

Webster (1977) offers this double meaning of *matching*: “to join, to fit together,” as well as “to provide with a counterpoint or complement.” Whereas all three infancy theorists of intersubjectivity use only the “similarity” form of matching, compensatory patterns expand our concepts of matching. That similar patterns of these positive and negative signs of vocal duration coordination can be found in infant–adult as well as in adult–adult conversations draws our attention to forms of dialogic timing that are as relevant in adulthood as in infancy. It is clear that similar forms of rhythmic coupling must function in psychoanalysis, but they have yet to be carefully studied (but see Holtz, 2003).

Nor do the three infant theorists address the significance of matching positive versus negative facial-vocal affective states. Field (1995; Field et al., 1990) and Cohn et al., (1990) have shown that, in contrast to controls, depressed mothers and their infants tend to match negative, rather than positive, states. Another example of matching negative states is a pattern of “mutually escalating overarousal” (see Beebe, 2000). This is a highly disturbing form of interaction in which, as the infant becomes vocally, facially, or bodily distressed, the mother matches the increasing arousal and escalates the level of stimulation, as if she felt increasingly desperate. Each partner then proceeds to match the other's increasing arousal and distress, each topping the other, going up and up and up, until the infant disorganizes, perhaps by vomiting (at four months) or screaming (at 12 months). In one mother–infant pair at four months where this pattern was characteristic



of the interaction, and the infant eventually vomited, the 12-month Ainsworth Strange Situation Test classified the infant as disorganized attachment (Beebe, 2000).

An interesting analogy to the pattern of mutually escalating overarousal can be found in Shakespeare's *Othello* (Act II, scene iv, lines 89 and following), in which Desdemona and Othello are arguing about Cassio (see McCrorie, 2000). Othello suspects Cassio of cuckolding him with Desdemona, while she innocently believes that it is right to advance Cassio's cause in Othello's army. Othello becomes increasingly enraged with Desdemona, and she, refusing to answer his pressing questions about a key handkerchief, continues to advance the cause of Cassio. Each continues to escalate until Othello loses all patience and storms off the stage.

By contrast, other forms of matching of negative states provide more successful modes of distress regulation. For example, by matching the infant's cry rhythm (but not the volume), it is possible to create a dyadic synchronization from which the caretaker can sometimes slowly "bring the infant down" into a slower and slower cry rhythm, facilitating the infant's capacity to reregulate and calm down (see the case of "Elliott", Beebe and Lachmann, 1998; Stern, 1985, 1995). Another example can be seen in the mother–infant treatment of Linda and her son, Dan (Cohen and Beebe, 2002). At 17 months, after positive face-to-face interactions with his mother and then his father, Dan played with a stranger (Beebe). Following several minutes of positive play with the stranger, Dan suddenly became completely still, collapsing tonus with his head down. The stranger became similarly still and waited. After half a minute, Dan looked up from under his brows, with his head still partially down. The stranger very softly said, "Hello, it's okay." Dan then looked down again, and became motionless. Dan and the stranger cycled through this pattern many times over, for about two and one-half minutes. Then, as suddenly as it came, it went, and Dan emerged partially smiling and gradually resumed play with the stranger. This interaction is an example of distress regulation by "matching" or "entering" a dampened state without trying to shift it. Beebe (1999) described a similar form of matching dampened distress states in the psychoanalytic treatment of Paulina, who did not look at the therapist or talk and sobbed most of the time. Knoblauch (1997, 1999, 2000) has also discussed certain forms of "matching" as distress regulation. Various forms of distress matching are illustrated in the treatment case in Paper IV.



Is matching of “negative” states the kind of matching that Trevarthen (1993a, 1998) and Stern (1985) had in mind? It is certainly one way of sensing the state of the other and thus is highly relevant to a theory of intersubjectivity in infancy. Does it make a difference to the meaning of “matching” whether the state of the infant is exuberance, interest, distress, avoidance, or deadness? We will return to this important question shortly.

The Role of Difference

Of the three infant theorists, Stern (1985) is the only one who discusses differences in any detail. His theory of affect attunement rests on the assumption that infant indeed perceives a lack of matching on the part of the caretaker and that the lack constitutes a failure of attunement. Systematic nonattunement in a particular arena of functioning would lead the infant to experience that this arena is not “shareable” and thus is potentially eventually “not-me.” Stern implies that failures of matching, for example, certain forms of difference, lead to failures of attunement or failures of intersubjectivity.

The American College dictionary (1962) defines *subjective* as “existing in the mind, belonging to the thinking subject, rather than belonging to the object of thought.” The definition of “inter” is “between, together, mutuality, reciprocity.” One reading is that “intersubjectivity” refers to what is going on between two minds. This is a more general and more neutral definition. Another reading suggests that intersubjectivity has to do with mutuality between two minds. This reading contains a bias toward the positive—mutuality or reciprocity. There is a tension between these two readings among the infancy and the adult theorists alike.

We prefer the first, more neutral reading. Intersubjectivity defined as “what is between two minds” encompasses the full complexity of how two minds interrelate, align, fail to align, or disrupt and repair alignment. We argue that differences are an intrinsic aspect of the structure of intersubjectivity in infancy (see also for adults Slavin and Kriegman, 1992; Benjamin, 1995). Even if the “positive” meanings of intersubjectivity are emphasized, such as shared mind or mutual recognition, *it is the process of moving back and forth between similarity and difference that constructs and fine tunes the alignment* (see Knoblauch, 2000; Benjamin, 1995). We endorse Tronick’s (1989) view that interactive repair is more ubiquitous and organizing in development than is matching per se.



Many examples of difference or disjunction could be offered, such as the pattern of “chase and dodge,” described by Beebe and Stern (1977). This is a complex, reciprocally regulated pattern, in which the mother’s movements of head and upper body toward the infant predict the infant’s movements of head and gaze away; reciprocally, the infant’s movements away from the mother predict the mother’s movements farther toward the infant. This pattern disturbs the infant’s use of looking away as a form of self-regulation to reduce arousal (Field, 1981), since the mother escalates activity just as the infant is reregulating down. The chase-and-dodge pattern is a familiar one among premature infants and some infants whose mothers are depressed (Field, 1981, 1995), in dyads where the infant is later classified as insecure (Langhorst and Fogel, 1982), and in mother–infant pairs who present for treatment (Beebe, 2000, 2003). If we use the definition of intersubjectivity that emphasizes (positive) mutuality between two minds, the chase-and-dodge interaction might be considered a failure of intersubjectivity. But using the more neutral definition of intersubjectivity as referring to what is between two minds, we can consider the chase-and-dodge interaction to be one form of intersubjectivity, albeit disjunctive, that this particular mother–infant pair has constructed.

Maternal disturbances of infant self-regulation can be found in other interactions in addition to chase and dodge. “Oral teasing” is a pattern in which the mother repeatedly moves her finger in and out of the infant’s mouth: the mother pulls the finger out and the infant pulls it back (Beebe, 2000). The infant learns to depend on the mother’s finger rather than use other forms of regulation over which he would have more control, such as putting his own finger in his mouth or various forms of self-touch. As the mother pulls her finger out, the infant fusses loudly; as she puts it back in, the infant quiets. Another example of disturbance of infant self-regulation can be found in interactions in which the mother pulls the infant’s hand away just as the infant has begun to self-soothe by fingering a piece of clothing or the strap of the seat (Beebe, 2003). Maternal disturbance of infant self-regulation is an important form of difference, disjunction, or conflict. The two partners have different agendas at such a moment (Slavin and Kriegman, 1992). The infant’s agenda is one of regulating arousal down to a more comfortable range, whereas the mother’s agenda may be to reengage the infant or soothe in a way that unwittingly disturbs the infant’s autonomy.



Perhaps the most extreme form of difference/disjunction at four months can be found in mother–infant interactions in which the infant is subsequently classified as disorganized attachment in the Ainsworth Strange Situation test at 12 months. In the four-month face-to-face interaction, the infant often shows extreme forms of distress and attempts to self-regulate, and the mother acts as if the infant is “fine,” almost as if she were with a different infant than the one in front of her. The infant has prolonged periods of vocal distress, frequent and prolonged periods of gaze aversion, moments of full head orientation away to 90° aversion, accompanied by arching the body away, and moments of loss of tonus, going limp and utterly still. The mother often smiles as the infant is distressed (an example of Lyons-Ruth’s, 1996, “interactive error”); keeps up a rapid pace of vocal, facial, and touch stimulation with little pausing; frequently stimulates while the infant is oriented away and not available for engagement; and often escalates negative facial and vocal expressions of the infant. This picture of a disorganized infant is based on the Jaffe et al. (2001) data set, and the description of a disorganized infant from the Lyons-Ruth (personal communication, August 18, 1999) data set is remarkably similar. In these disjunctive interactions, the mother essentially denies the infant’s distress, and there is a failure of “mentalizing” (Fonagy, 1994, 1995): she does not wonder what is wrong, nor does she make attempts to repair. Perhaps this distress is something she cannot bear because of her own unresolved traumatic past (Main and Hesse, 1992; M. S. Moore, personal communication, July, 1999). The infant’s extreme forms of self-regulation, finally going limp and utterly still, seem to be a form of “playing dead” or “playing possum,” described by Beebe and Stern (1977) and Papousek and Papousek (1977, 1987), as if going dead might make this stimulation stop.

Similarities and Differences Have Different Meanings in Different Infant Affective Contexts

Infants have a wide affective-engagement range. Using the dimensions of infant orientation to partner, gaze at partner, facial expression, vocal distress, bodily tonus, and physiological arousal, the following range can be roughly schematized (see Figure 1): exuberant face and vocalization, positive face and vocalization, interest face and vocalization, neutral face, negative face (frown, grimace) and

Similarities and Differences Have Different Meanings in
Different Infant Affective Contexts

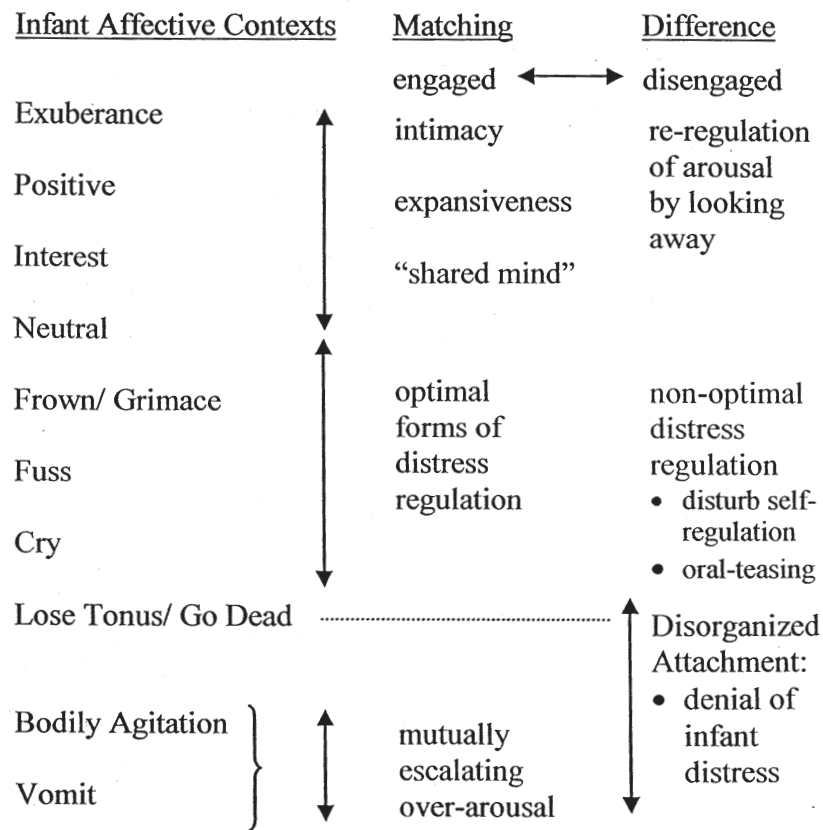


Figure 1. Similarities and Differences Have Different Meanings in Different Infant Affective Contexts

vocalization (fuss, cry), loss of tonus (head hangs limp), bodily agitation (feet rapidly moving, head and body arching away), physiological disorganization (vomit). Given these different infant affective contexts, similarities and differences have different meanings, illustrated in Figure 1.

Matching interactions in the range from exuberance to neutral seem to be the subject of the three infancy theorists of intersubjectivity.



Matching in this range might generate experiences of intimacy, expansiveness, and “shared mind”. Matching interactions in the range of negative face or vocalization might characterize optimal forms of distress regulation, where the caregiver temporarily “joins” the infant’s distress but stays under the infant’s level of activation and arousal. Matching the infant’s loss of tonus is rare. It occurred once in the chase-and-dodge interaction, when the mother hung her head and limp went for several seconds, while the infant was engaged in this behavior as well. This form of joining may signal maternal feelings of defeat or despair. Matching agitation in the form of mutually escalating overarousal would be considered a disruption of the ongoing exchange.

Difference interactions in the range from exuberance to neutral can be considered “usual” disengagements within the ongoing flow of engagement and disengagement, and match, disruption and repair. These are moments in all interactions, well described by Tronick (1989) and Field (1981), as well as in the early work of Stern (1971, 1977; Beebe and Stern, 1977), that were not specifically concerned with intersubjectivity. Difference interactions in the infant range of negative face and vocalization, loss of tonus, agitation, and physiological distress can also be considered “usual,” since there are other ways of consoling an infant than matching these distress behaviors (the most obvious of which is physical holding). However, difference in the form of an agenda different from the infant’s, such as disturbing infant self-regulation attempts or oral teasing at distressed moments, can be considered forms of disjunction or conflict. When the infant loses tonus and “goes dead, one facilitative form of regulation might be a partial match of the infant by joining the dampened state and waiting, as described earlier in the cases of Dan and Linda (Cohen and Beebe, 2002). This response facilitated Dan’s return to the engagement. But a full match by losing tonus in a limp head-hang would not seem an optimal form of response for the adult partner in as much as it might suggest defeat or despair. Finally, the interactions of infants later classified as disorganized attachment illustrate difference in the form of severe disjunction, such as maternal teasing, ignoring, laughing, or intrusive response to infant facial and vocal distress, arching away, or losing tonus and playing dead.

The preceding description of variations in the meanings of matching and difference is an attempt to illustrate the complexity of these early interactions. “Matching” or “correspondence” can be both optimal and nonoptimal for the ongoing exchange. Similarly there are more



“usual” as well as “disjunctive” forms of difference, both of which must be included in a theory of the origins of infant intersubjectivity. Particularly the more usual forms of difference (such as infant looking away, reregulating arousal to a lower range, while partner pauses) are part and parcel of the ongoing regulation of the moment-by-moment exchange.

The Place of Interactive Regulation

If behavioral similarities are the core of intersubjectivity, as the three infancy theorists propose, how do those similarities work? Cross-modal matching is one mechanism common in the theories of all three; rhythmic coupling is another mechanism proposed by Trevarthen (1993a, b). What is implicit, but not developed, is the central mechanism of the mutual regulation model, namely, interpersonal contingencies. All three infancy theorists work with behavioral similarities without attempting to document statistically that each partner is *contingent* on the other, that each “influences” the other moment by moment, in the sense that each person’s behavioral stream can be predicted from that of the other. Interpersonal contingencies are co-constructed patterns: in most data sets; each person is contingent on the other (see, e.g., Cohn and Tronick, 1988; Jaffe et al., 2001). Thus interpersonal contingencies have to do with the *process* of dyadic patterns of relatedness, rather than simply with whether the other is similar or different at a particular *moment*.

From birth an infant is a “contingency detector” (Papousek and Papousek, 1977; DeCasper and Carstens, 1980) detecting predictable consequences of his own actions. For an event to be perceived as contingent by the infant, it must occur rapidly, within one to two seconds (Millar and Watson, 1979), and it must be predictable, that is, it must occur with greater than chance probability, following the infant’s behavior. The infant’s perception of contingencies, in conjunction with an optimally contingent environment, organizes the infant’s expectation that he can affect, and be affected by, the partner: a crucial origin of the experience of effectance (White, 1959) or agency (see Rustin, 1997; Sander, 1977).

Contingencies are also associated with affect: confirmation of expected contingent effects leads to positive infant affect; violation of expected contingent effects leads to negative infant affect; and failure to provide contingencies disturbs the capacity to learn



(DeCasper and Carstens, 1980). Gergeley and Watson (1998) have suggested that an infant's capacity to interpret stimulation as contingent (or not) may well be the most fundamental of the infant's capacities for interpreting sensory information. A similar position is held by Fagen et al. (1984; Shields and Rovee-Collier, 1992), who have used infants' capacities to perceive contingencies to document a remarkable array of early abilities to create expectancies of anticipated events, and to remember them across days and weeks.

Murray and Trevarthen (1985) experimentally removed the perception of contingency during mother–infant interaction. First mother and infant interacted normally over closed-circuit TV in separate rooms. Then each was shown a “replay” of the partner interacting a few minutes earlier. Thus each “looks normal,” looking around and smiling in the previous ongoing exchange; but then, during the replay, neither partner's behavior was contingent on that of the other. The infant became distressed and avoidant, and the mother became critical and self-focused. The loss of the perception of ongoing contingent responsiveness in the partner disturbed the engagement and generated extreme forms of self-regulation in both partners.

Matching per se does not imply contingency: matching can be a random event rather than a specific response. For example, each partner might blink at the same time, without blinking being a pattern that is recurrent and predictable. Likewise, contingency can occur without matching: my frown can be contingent on your smile. Matching does not necessarily indicate a contingent interpersonal influence process through which the behavior of two partners may become similar. Matching does not qualify as an analysis of interactive *process* without explicit documentation of contingencies.

Both Trevarthen (1993a, b, 1998) and Stern (1985) place infant intersubjectivity within a mutual-regulation model, but neither empirically consolidates this aspect of their theories. Trevarthen's genius lies in the careful illustration of the single case. There is, however, no systematic statistical documentation of interactive contingencies, nor does he address the generalization of the phenomena he describes, so that this aspect of his work remains theoretical rather than solidly empirical. Stern's (1971, 1985, 1994, 1995) conceptualization of the interactive process is elegant. But his key matching data (Stern, 1985) illustrating maternal attunement do not address maternal *contingent* responsiveness, and his data do not address the reciprocal process of infant matching mother.



Within the mutual-regulation model, each partner experiences both affecting the other and being affected in a predictable process. The content of the influence is not specified. Each could be influencing the other to become systematically similar, matching and being matched. Or each could be influencing the other such that they become systematically dissimilar, which we have described as “compensatory matching.” Either process could be optimal or nonoptimal for the interaction. But both halves of the bidirectional regulation process are essential to consider. Thus we propose that *sensing that one affects the partner in an ongoing, predictable (contingent) way, and that the partner has a reciprocal affect on oneself, is just as important in the origins of intersubjectivity as the perception of correspondence itself.* This concept is dramatically illustrated in the treatment case in Paper IV.

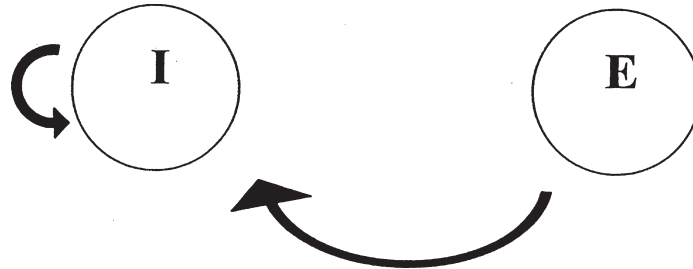
Differing Uses of the Systems View of Interaction by Meltzoff, Trevarthen, and Stern

Figure 2 illustrates the differing uses of the systems view of interaction by Meltzoff, Trevarthen, and Stern. For Meltzoff (see Paper II), the line representing the experimenter’s (E) impact on the infant is darkened. The reciprocal route of the infant’s affect on the experimenter is not explored in Meltzoff’s work. The line representing the infant’s self-regulation is also darkened, representing the infant’s own effort to match, with successive approximations, using proprioceptive feedback. The advantage of Meltzoff’s approach is that it isolates a particular mechanism, facial imitation. The disadvantage is that intersubjectivity is an inherently dyadic and communicative phenomenon, so that his experimental approach cannot capture the whole process. Meltzoff makes a profound contribution, but his work needs to be integrated with approaches that address the ongoing regulation of the communicative process itself. *Meltzoff’s approach privileges the infant’s mind, at the moment of matching the other.*

Trevarthen (see Paper II) endorses a bidirectional model of interactive regulation in his “psychology of mutually sensitive minds,” in which the infant is aware of contingent effects and the brain is specialized for the mutual regulation of joint actions. For Trevarthen, the lines representing both the infant’s impact on the mother and the mother’s impact on the infant are equally darkened in Figure 2. The routes representing mother and infant self-regulation are present, but

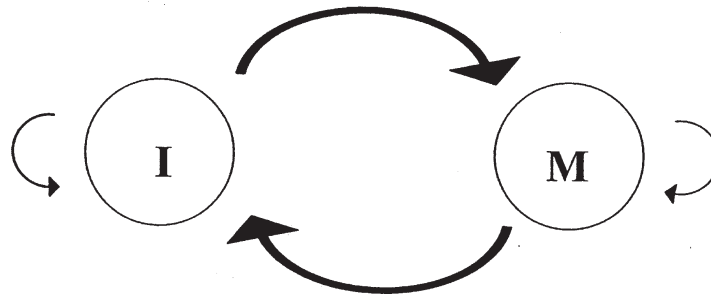


MELTZOFF – birth



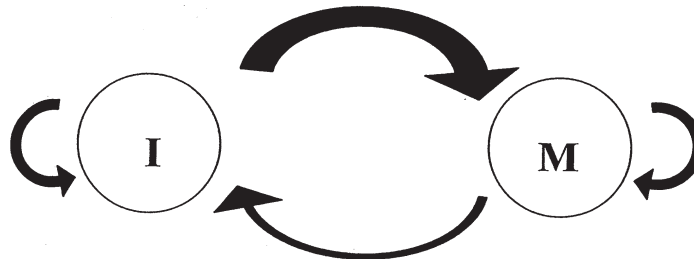
Infant makes cross-modal match (imitation) of experimenter's (E) expression, utilizing proprioceptive feedback from facial movement to match the form of the model's expression. Other is experienced "like me." Meltzoff does not address the impact of the infant on the experimenter.

TREVARTHEN – birth



Mutual matching of movement patterns, via time, form, intensity, and coupled rhythms permits inter-coordination of inner states. The self-regulation process is not elaborated.

STERN – 9-12 months



Intersubjectivity is a mutual regulation process, "changing with" the split-second shifts of the partner. Affect attunement = mother's cross-modal matching of timing, form and intensity of behaviors. Inner states are matched and regulated. Mother's role more elaborated than infant's.

Figure 2. Systems Model of Interaction: Comparison of Meltzoff, Trevarthen and Stern.



not darkened. Inner states are coordinated through the interactive process, but this aspect of Trevarthen's theory is not as well developed as interactive regulation. *Trevarthen privileges the moment of immediate sympathetic contact between two minds.*

Stern (1971) began his career with a study of the interactive process between a mother and her twins, an elegant statistical analysis of split-second, bidirectional contingencies of head orientation and gaze changes. Consistent with this work, Stern (see Paper II) conceptualizes intersubjectivity as a mutual-regulation process, with each partner changing with the shifts of the other. But, curiously, his core concept of intersubjectivity, affect attunement, is illustrated with data documenting the mother's matching the infant, but not the infant's matching the mother. The infant's primary role seems to be a perception of whether or not the parent attunes. Thus, for Stern, the lines representing both the infant's impact on the mother and the mother's impact on the infant are darkened in Figure 2, but unequally, emphasizing the mother's attunement to the infant. The routes representing both mother and infant self-regulation are darkened, consistent with Stern's emphasis that the matching process of intersubjectivity regulates the *inner state* of each partner. But Stern seems to lose the interactive dance in his descriptions of affect attunement. *Stern privileges the moment at which the parent attunes to the infant.*

The Role of Self-Regulation

Overall, the three infancy theorists omit self-regulation as a critical aspect of intersubjectivity. Of the three, Stern (1985) conceptualizes self-regulation somewhat. But inner states of activation and arousal are simultaneously regulated within the organism, as well as through interaction with the partner. A theory of interaction must address how each person is affected by his own behavior, as well as by that of the partner (Thomas and Martin, 1976; Sander, 1977; Tronick, 1989; Beebe et al., 1992; Beebe and Lachmann, 1998). Furthermore, self- and interactive regulation continuously affect each other (Gianino and Tronick, 1988). Thus a theory of intersubjectivity in infancy must include issues of self-regulation as a central feature.

Infant research on face-to-face interaction addresses self-regulation patterns in the context of the interaction with the partner. The core



question of the three theorists—that is, how infants sense the state of the partner—will of necessity be affected by how infants sense and regulate their own states, as well as by how they perceive and align with the state of the partner. Other research designs, such as that of Sander (1977, 1995) on the regulation of the 24-hour cycle, and that of Demos (1989; Demos and Kaplan, 1986), who filmed infants while alone, can address another aspect of self-regulation, that having to do with “alone states.” This aspect of self-regulation can be related to the capacity to be alone (Winnicott, 1965), the private self, moments of absorption in the environment, or Winnicott’s incommunicado self. Alone states are not part of the research design of the study of face-to-face interactions.

The study of self-regulation within the face-to-face exchange is still sparse (see Beebe and Jaffe, 1999). Tronick (1989; Gianino and Tronick, 1988) has shown that infants of depressed mothers are preoccupied with self-regulation (oral and tactile self-touch) at the expense of interactive engagement in the face-to-face exchange. Recent work by Koulomzin et al., (2002; see also Beebe and Lachmann, 1998) documented difficulties in self-regulation in four-month-old infants who were classified as avoidant attachment at one year. In contrast with those who would be classified as secure, avoidant infants at four months looked less at mother. Only with a self-touch form of self-comfort could these infants sustain, vis-à-vis orientation and looking at mother, in a manner comparable to the secure infants. Issues of self-regulation clearly affect the nature of the interactive regulation, and vice-versa.

The issue of self-regulation is particularly critical during infant distress. Continued matching of infant escalating arousal can lead to mutually escalating overarousal, as described earlier. Instead, caregiver responses that assist infant self-regulation and facilitate infant down-regulation of arousal, are preferable.

Self-regulation is also organized at the physiological level. It is essential to understand how inner and interactive experiences are linked at a physiological level, which none of the three theorists addresses (see Beebe and Lachmann, 1998). For example, examining the lateralization of the brain for positive and negative emotion using EEG, Davidson and Fox (1982) have shown that, even *in the absence of a matching behavior*, the mere perception of emotion in the face of the mother creates a resonant emotional state in the infant. This kind of research calls into question the exclusive reliance of all three theorists



on behavioral correspondences for understanding how an infant can sense or align with the state of the partner.

A vignette from a videotaped psychoanalytic session in which the female patient sat up can illustrate the relevance of self-regulation for psychoanalysis. This description primarily addresses the nonverbal and implicit modes of the interaction. The patient was increasingly distressed, speaking tensely, gesturing rapidly with her hands, her torso leaning forward tautly, her face screwed into a pincery. The analyst was silently listening, his face very attentive. As the patient's agitation began, the analyst slightly shifted the orientation of his chair toward the patient. Both maintained continuous eyecontact. As the agitation mounted, the analyst's foot made intermittent brief, rapid jiggles, matching the rhythm of the patient's body. He then moved slightly forward in his chair. At this point the heads of both analyst and patient went up in a synchronous movement. At each escalation of the patient's agitation, the analyst participated, crossing and uncrossing his legs and nodding his head up and down in rhythm with the patient's movements and each time saying "Yes," softly. Gradually the patient began to calm down; the analyst's head movements became slower. There were several long moments of silence. Then slowly they began to speak to each other.

In this vignette, the analyst participated in a sequence of escalating agitation and calming down. Although the patient's sequence can be conceptualized primarily as self-regulation, presumably the analyst's movements also influenced her management of the arousal. The analyst did not match the patient's level of arousal. Instead, at critical shifts in the patient's arousal (increasing and decreasing), the analyst "marked" the shifts with shifts of his own. The analyst's own self-regulatory movements revealed his inner state as a response to the patient. His efforts to regulate his inner state showed the patient that he was *with* her: these efforts were simultaneously self-regulatory and communicative to the patient, presumably out of awareness of both.

The Balance Model of Self- and Interactive Regulation: The Optimal Range

The concept of match or correspondence addresses *a particular moment in time*. In contrast, the mathematics used to assess interactive



contingencies deals with the interpersonal *process of predictability over time*. The terms *tracking and being tracked* (Beebe and Lachmann, 1998; Beebe and McCrorie, submitted) and *coordinating or looser and tighter coupling* (Jaffe et al., 2001) may better capture the process quality of these exchanges. Tracking, coordination, and coupling are synonymous with contingency or influence.

The meaning of *degree* of coordination remains controversial. The adult empirical literature has debated the varying positions that high coordination is optimal (Chapple, 1970), high coordination indexes distress (Gottman, 1979), and midrange coordination is optimal (Warner et al., 1987). This debate has not been widely aired in the infant literature (for an exception, see Cohn and Elmore, 1988; Dunham and Dunham, 1990; Jaffe et al., 2001). *This issue has not been addressed at all in theories of intersubjectivity, infant or adult.*

Jaffe et al. (2001) have documented a continuum of *degrees* of interactive coordination of vocal rhythms between mothers and infants, and strangers and infants, at four months, which predicted infant attachment outcomes at one year. This continuum ranges from high coordination, or tight coupling (vigilant), to low coordination, or loose coupling (inhibited). *Midrange* interactive coordination predicts secure infant attachment, whereas scores outside the midrange predicts insecure. Thus *degrees* of interpersonal contingencies are essential to consider within the broader concept of mutual regulation. A number of other infant studies have also documented that midrange degrees of interpersonal contingency in the middle of the first year predict secure attachment outcomes at one year (Lewis and Feiring, 1989; Malatesta et al., 1989; Isabella and Belsky, 1991; Leyendecker et al., 1997). Consideration of matching and correspondence needs to be entirely refined by a consideration of *degrees of interpersonal contingency in the process of becoming more (or less) similar over time. The concept of degrees of coordination refines the mutual regulation model.*

Elaborating the theories of interaction of Sander (1977, 1995) and of Tronick (1989; Gianino and Tronick, 1988), and building on the Jaffe et al. (2001) finding that midrange coordination predicts secure attachment, Beebe and her coworkers (Beebe and Jaffe, 1999; Beebe and McCrorie, 2003) have conceptualized a “balance model of self- and interactive regulation.” This midrange balance model can be integrated into both Trevarthen’s (see Paper II) and Stern’s (see Paper II) views of the origins of intersubjectivity. The “balance model” builds on the findings of interactive regulation (Jaffe et al., 2001) and adds

THE MIDRANGE MODEL OF
SELF- AND INTERACTIVE REGULATION

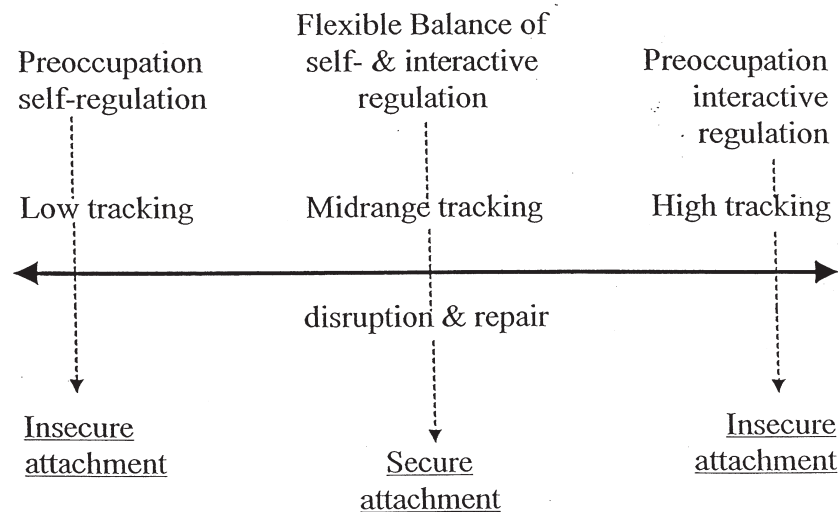


Figure 3. The Midrange Model of Self- and Interactive Regulation.
From Beebe and Lachmann (2002).

self-regulation by hypothesizing a midrange optimum in both, illustrated in Figure 3. The balance model posits that in the midrange, interactive coupling is present but not obligatory, and self-regulation is preserved but not excessive (Beebe and Jaffe, 1999). Optimal social communication and development are hypothesized to occur with flexibility to move between self- and interactive regulation, presumably facilitating disruption and repair processes and yielding relatively optimal levels of infant attention, affect, and arousal. For each partner, operating outside the midrange may index an attempt to cope with a disturbance in the interaction. Excessive monitoring of the partner, at the expense of self-regulation, defines one pole of imbalance, “interactive vigilance”; preoccupation with self-regulation, at the expense of interactive sensitivity, defines the other pole of imbalance; “withdrawal” or “inhibition” (see Beebe and Jaffe, 1999). Tronick



(1989) documented that various failures in interactive regulation in depressed mothers and their infants, without repair, were followed by the infants' preoccupation with self-regulation of distress states on their own. Applied to the concept of intersubjectivity, the balance model adds self-regulation, expands the issues of similarity (or difference) into a broader realm of degrees of contingency, and posits optimal and less optimal integrations of self- and interactive regulation. Paper IV (in part II of the symposium) illustrates the use of the balance model in an adult treatment.

In summary, building on Meltzoff, Trevarthen, and Stern, we have articulated a fourth position, suggesting that matching positive and negative states, difference states, modes of disruption and repair, distress regulation—and, in fact, *all patterns* of self- and interactive regulation, including vigilant, midrange, and inhibited contingencies, as well as the loss of the dialogue in states of loss of tonus or “deadness”—are relevant to early presymbolic forms of intersubjectivity. All forms of interactive regulation are relevant to perceiving and aligning oneself with the moment-by-moment process of the other. These forms of intersubjectivity, documented in infant research, are profoundly relevant to psychoanalytic forms of intersubjectivity, as we illustrate in Paper IV.

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