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On the Origins of Disorganized Attachment and Internal Working Models: Paper II. An Empirical Microanalysis of 4-Month Mother–Infant Interaction

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A microanalysis of 4-month mother–infant face-to-face communication predicted 12-month infant disorganized (vs. secure) attachment outcomes in an urban community sample. We documented a dyadic systems view of the roles of both partners; the roles of both self- and interactive contingency; and the importance of attention, orientation, and touch, as well as facial and vocal affect, in the co-construction of attachment disorganization. The analysis of different communication modalities identified striking intrapersonal and interpersonal intermodal discordance or conflict, in the context of intensely distressed infants, as the central feature of future disorganized dyads at 4 months. Lowered maternal contingent coordination, and failures of maternal affective correspondence, constituted maternal emotional withdrawal from distressed infants. This maternal withdrawal compromises infant interactive agency and emotional coherence. We characterize of the nature of emerging internal working models of future disorganized infants as follows: Future disorganized infants represent states of *not being sensed and known* by their mothers, particularly in moments of distress; they represent confusion about both their own and their mothers' basic emotional organization, and about their mothers' response to their distress. This internal working model sets a trajectory in development which may disturb the fundamental integration of the person. The remarkable specificity of our findings has the potential to lead to more finely focused clinical interventions.

Our purpose is to bring to the attention of a clinical audience aspects of a study predicting infant attachment at 12 months from a microanalysis of mother–infant interaction at 4 months (Beebe et al., 2010). Here we summarize a subset of the findings, those predicting disorganized attachment, and the implications for infant internal working models of attachment at 4 months. The findings can alert clinicians to a new range of intrapersonal and interpersonal communication disturbances, particularly discordant and contradictory interactions, which may disturb the integration of emotional experience in infancy. Moreover, disorganized attachment is of particular interest to clinicians who treat adults, because disorganized attachment in infants at 12 months predicts dissociation in young adulthood (Lyons-Ruth & Jacobvitz, 2008; Sroufe, Egeland, Carlson, & Collins, 2005).

In Paper I we described the dyadic systems approach that informed these empirical analyses (Beebe & Lachmann, 2012, Paper I). Now in Paper II we address associations of mother–infant interaction at 4 months with disorganized infant attachment at 12 months. We examine at 4 months (a) the temporal *process* of relating, through self- and interactive contingency analyses, and (b) *the content of relating*, qualitative features of the form and intensity of behaviors. *Self-contingency* refers to how predictably a behavior unfolds within the individual; *interactive*

contingency (previously termed interactive “regulation”) refers to how each individual’s behavior modifies and is modified by the changing behavior of the partner (Beebe & Lachmann, 2002, Paper I; Fogel, 1993).

Comparing disorganized (vs. secure) attachment, contingency analyses evaluated at 4 months (a) which partner (mother/infant) showed an altered (increased/decreased) degree of contingency that predicted disorganized (vs. secure) attachment at 12 months; (b) whether contingency was increased, or decreased; (c) the type of contingency that was altered, self- or interactive; and (d) the communication modality of contingency that was altered (attention, affect, orientation, touch). We refer to infants at 4 months who will be classified as disorganized (D) or secure (B) attachment at 12 months as “future” disorganized or secure infants.

We hypothesized that disorganized attachment biases the system toward self- and interactive contingencies which are *both heightened* (in some modalities) *and lowered* (in other modalities), compared to those of secure dyads. This hypothesis stands in contrast to the typical position of the infant literature which postulates that “more” contingency is “better” (see, e.g., Van Egeren, Barratt, & Roach, 2001; but see Cohn & Elmore, 1988). Our hypothesis is based on prior findings that interactive contingency of vocal rhythms in insecure dyads was both heightened and lowered, compared to secure dyads who were midrange (Jaffe, Beebe, Feldstein, Crown, & Jasnow, 2001; Leyendecker, Lamb, Fracasso, Scholmerich, & Larson, 1997). It was also hypothesized that future disorganized (vs. secure) infants and their mothers would show differences in the *content* of behavior, such as more time looking away from the partner’s face; more negative affect; more infant “discrepant” affect (simultaneous positive and negative affect); more maternal intrusion such as “loom,” “chase and dodge,” or intrusive touch; and more maternal “affective error” (mother smile or surprise during moments of infant distress: see Lyons-Ruth, Bronfman, & Parsons, 1999).

METHOD

Participants

Within 24 hours of delivering a healthy firstborn infant, mothers were recruited from a large urban hospital for a study of “infant social development.” The subjects ($N = 84$) completed two lab visits: a 4-month videotaping of mother–infant face-to-face interaction and a 12-month videotaping of the separation-reunion paradigm, the Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978), to assess attachment classification. The subjects were a low-risk, ethnically diverse community group of primiparous women delivering full-term, singleton infants without major complications. The mothers turned out to be highly educated. In this study we compare the 4-month mother–infant interactions of 17 dyads where infants were classified disorganized at 12 months, with 47 dyads where infants were classified secure at 12 months.

Procedure

Scheduling of lab visits took into account infant eating/ sleeping patterns. At 4 months, mothers were seated opposite the infant seated in an infant seat on a table. Mothers were instructed to play with their infants as they would at home, but without toys, for 10 minutes. Two video cameras generated a split-screen view of the interaction. At 12 months, consistent with our prior procedure

(Jaffe et al., 2001), following a face-to-face interaction, a break, and a snack, mothers and infants participated in the Ainsworth Strange Situation.

Self and Interactive Contingency

Each person's behavior is affected both by one's own prior behavior (self-contingency) and by that of the partner (interactive contingency; Thomas & Malone, 1979). Because any behavior pattern in a face-to-face encounter may participate simultaneously in self- and interactive contingency functions, every behavior must be assessed for both functions. Time-series methods are designed to partition these two sources of variance, self and interactive. *Self- and interactive contingency* are defined, using lag correlations, as predictability within (autocorrelation) and between (lagged cross-correlation) two partners' behavioral streams over time (for details, see Beebe et al., 2010).

Modalities of Communication

We examine *separate* modalities of communication, as well as a composite measure of "facial-visual engagement." The modalities chosen are *attention* (gaze at/away from partner's face); *affect* (facial affect [positive to negative], infant vocal affect [positive to negative], and composite facial-visual engagement); *spatial orientation* (mother sitting upright, leaning forward, looming in; infant head orientation [from vis-à-vis to 60–90° aversion and arch]); and *touch* (maternal affectionate to intrusive touch, frequency of infant-initiated touch behaviors [none, one, two-plus of touch own skin, object, mother]). For each modality, we created an ordinalized behavioral scale as required by time-series methods (except gaze at or away from partner's face). We also created ordinalized facial-visual "engagement" scales for mother and infant, which capture a more holistic gestalt than single modalities. In addition we examined two dyadic codes, "mother chase – infant dodge" and "mother positive/surprised while infant distressed." The first 2.5 minutes of the mother–infant interaction were coded second by second for each of the modalities just listed, separately for mothers and infants (for coding and reliability details, see Beebe et al., 2010).

Among the modalities of attention, affect, orientation and touch, many possible pairs of infant and mother modalities could be made. Eight mother–infant "*modality-pairings*" were generated for examination of 4-month self- and interactive contingency in relation to 12-month attachment, as follows: (1) infant gaze – mother gaze, (2) infant facial affect – mother facial affect, (3) infant vocal affect – mother facial affect, (4) infant facial-visual engagement – mother facial-visual engagement, (5) infant engagement – mother touch, (6) infant vocal affect – mother touch, (7) infant-initiated touch – mother touch, (8) mother spatial orientation – infant head orientation. Our criterion was the same modality for both partners where possible (pairings 1, 2, 4, 7, 8). In the third pairing we examined infant vocal affect as a second way of exploring the infant's emotional response to the mother's face. We explored maternal touch in relation to infant vocal affect and touch (pairs 5, 6, 7) and infant engagement, reasoning that infants may respond to more intrusive forms of maternal touch with vocal distress, increased touch efforts, or changes in facial-visual engagement. We also explored a ninth intrapersonal pairing *within* the infant: (9) infant touch – vocal affect, following Tronick's (1989) view that infant self touch has a self-comforting function, inhibiting negative infant affect (see Beebe et al., 2010).

Coding of Secure and Disorganized Attachment

In the reunion episodes following brief separations from mother in a laboratory setting, 12-month infants who are classified secure attachment immediately greet the mother and are able to be easily comforted and to return to play. In contrast, infants who are classified disorganized attachment show fearful, odd, and conflicted behaviors. The definition of disorganized attachment is a breakdown of an organized strategy for dealing with distress, leading to fear, apprehension, and confusion. The core coding criterion for disorganized attachment is simultaneous or sequential display of approach and avoidance behaviors. Infants may also show contradictory behavior; undirected, misdirected, or interrupted behavior; asymmetrical, mistimed, or anomalous behaviors; freezing, stilling, or slowed movements; or apprehension regarding the parent. In addition to the categories of secure vs. disorganized attachment, we also classified infants by the 7-point “degree of disorganization” scale. We refer to infants as male, to distinguish infants from mothers. We refer to infants at 4 months as “future” secure or disorganized.

RESULTS AND DISCUSSION

We first briefly note the findings of future secure dyads at 4 months (see Beebe et al., 2010 for details) and propose descriptions of the internal working models of these dyads. We then describe our findings of how future disorganized dyads differ from future secure infants at 4 months. Finally, we provide a discussion of the internal working models of future disorganized infants at 4 months.

Future Secure Dyads

Self-Contingency

Within the subset of future *secure* dyads, all 4-month mother and infant *self*-contingency values were significant. Thus all mother behaviors (gaze, facial affect, facial-visual engagement, touch and spatial orientation) and infant behaviors (gaze, facial affect, vocal affect, facial-visual engagement, touch, and head orientation) had predictable individual rhythms, facilitating predictability within each individual’s experience, and “readability” of each individual for the partner.

Interactive contingency of attention and affect

In future secure dyads, mothers and infants followed the other’s direction of attention as each looked and looked away from the partner’s face, a bi-directional pattern in which each can predict the other’s likelihood of looking and looking away. Mothers facially followed the direction of infant facial and vocal affect as it became more and less positive and negative, and infants reciprocally followed the direction of maternal facial affect with their own facial and vocal affect. This is a *bi-directional facial/vocal mirroring process*: each can predict the other’s affective behavior, and each can anticipate that the partner will follow his or her own direction of affective

change. Mothers followed infant direction of facial-visual engagement (more and less engaged), but infants did not follow mothers, a uni-directional contingency pattern.

Interactive Contingency of Spatial Orientation

In future secure dyads, we documented a uni-directional process. Future secure infants are sensitive with their head movements to maternal spatial orientation, but mothers are not reciprocally sensitive with their spatial orientation to infant head orientation. As mothers move from sitting upright to leaning forward to looming in, infants move their heads away, from vis-à-vis to orienting away to arch; as mothers move back toward upright, infants return toward vis-à-vis.

Interactive Contingency of Mother Touch – Infant Behaviors

In future secure dyads, as infant vocal affect is more positive, maternal touch patterns are more affectionate (and vice versa). And as infants touch more (from none, to one, to two-plus touch behaviors per second), maternal touch patterns are more affectionate. As maternal touch patterns are more affectionate, infant engagement is more positive (and vice versa). But infants do not contingently coordinate their vocal affect or touch behaviors with mother touch. Perhaps future secure infants do not coordinate with mother touch with their own vocal affect or touch because maternal touch is “good enough,” and thus can remain in the background.

Infant Intrapersonal Contingency of Vocal Affect – Touch

In future secure infants, as infant affect is more positive, infant touch is more likely, and vice versa. Reciprocally, as infant touch is more likely, infant vocal affect is more positive (and vice versa). Thus future secure infants learn to expect that their own touching maintains positive vocal affect, and positive vocal affect facilitates more touch.

Internal Working Models of Future Secure Dyads

Overall, future secure dyads may develop an internal working model of face-to-face interactions in which infants and mothers come to expect, “I can anticipate when you will look and look away; I know your rhythms of looking at me; I feel seen by you. I follow your feelings up and down as I feel more happy or more distressed; we go up to the top positive peak together; what I feel and what I do resonates in you” (E. Shane, personal communication, November 12, 2006). In addition, future secure infants may come to expect, “I can count on you to share my feelings, to ‘get’ what I feel; I feel known by you. I know how your face goes, I know you. I know I can influence you to touch me more tenderly when I need it.” Mothers of future secure infants may come to expect, “I know that when I touch you more affectionately, you will look at me and smile more. I know that moving forward and looming in is hard for you, and you orient away. I know that when I move back, you come back to me.”

Future Disorganized (vs. Secure) Dyads: Results

This section describes the ways in which the interactions of future disorganized and future secure dyads differ at 4 months. In the following section we provide an interpretive discussion of these findings regarding the origins of infant internal working models of disorganized attachment. The results are organized by the domains of attention, affect, spatial orientation, touch, and infant intrapersonal vocal affect – touch, examining differences in both behavioral qualities (*content*) and degrees of self- and interactive contingency (*process of relating*) between future disorganized versus secure infants. Although there were no associations of maternal ethnicity, age or education with future disorganized (vs. secure) infants, male infants were overrepresented in future disorganized infants.

Attention Dysregulation in Future Disorganized Dyads

Those mothers who gazed away from the infant's face "excessively" (30 seconds or more across the 2.5 minutes coded) were more likely to have infants with greater "degree" of 12-month attachment disorganization (7-point scale). These mothers also looked and looked away in a less predictable fashion, a lowered maternal self-contingency of gaze. Lowered maternal self-predictability indicates less stability, a lowered maternal ability to anticipate her own next move, and a greater infant difficulty in anticipating maternal gaze rhythms.

Affect Dysregulation in Future Disorganized (vs. Secure) Dyads

Infants. Future disorganized (vs. secure) infants showed greater distress: more (a) vocal distress, (b) combined facial and/or vocal distress, and (c) discrepant affect (simultaneous positive and negative facial and vocal behavior within the same second). Discrepant affect was likely to be vocal distress, such as whimper, while simultaneously facially positive (smiling). These infants also showed lowered self-contingency in facial-visual engagement, a "self-destabilization." It is harder for future disorganized (vs. secure) infants to sense their own next engagement "move," as well as harder for their mothers to anticipate infant engagement changes. Lowered infant engagement self-contingency occurred in the context of lowered maternal engagement coordination (discussed next), a maternal failure to adequately coordinate with infant engagement. This is an infant intrapersonal dysregulation linked to a maternal interpersonal dysregulation.

Mothers. Maternal affect dysregulation was seen in three findings.

First, mothers of future disorganized (vs. secure) infants *lowered* their *contingent engagement* coordination with infant engagement, a lowered maternal ability to emotionally "enter" and "go with" infant facial/vocal distress, as well as positive moments. These mothers were less likely to follow infant direction of gaze (at and away from mother's face); to become facially positive as their infants became facially/vocally positive; and to dampen their faces toward interest, neutral or "woe face" as their infants became facially/vocally distressed. Lowered maternal contingent coordination lowers the infant's contingent "control," compromising infant agency. It is harder for these infants to anticipate the maternal behavior that is likely to follow their own previous behavior, harder to expect that their own behavior affects that of the mother. This finding

is consistent with clinical descriptions of disturbances in maternal “mirroring” (Kohut, 1977; Winnicott, 1965).

Second, mothers of future disorganized (vs. secure) infants *heightened* their *facial self-contingency*, remaining overly facially stable, a “closing up” of one’s face. It may operate as a way to avoid facial involvement and it is another dimension of faulty maternal facial mirroring. Mothers at times look almost blank, as their faces stay relatively neutral and stable over several seconds, similar to mothers who are instructed to keep a “still-face” (Tronick, 1989).

Third, mothers who were more likely to show positive expressiveness or surprise while infants were facially/vocally distressed were more likely to have infants with greater degree of attachment disorganization, consistent with the literature (Goldberg, Benoit, Blokland, & Madigan, 2003; Lyons-Ruth et al., 1999; Madigan et al., 2006). This finding goes beyond disturbances of facial mirroring and identifies a maternal “denial” of infant distress.

Spatial Dysregulation in Future Disorganized (vs. Secure) Dyads

Mothers of future disorganized (vs. secure) infants showed more “loom” movements of the head close in toward the infant’s face, considered frightening by Main and Hesse (1990). Maternal loom was accompanied by lowered maternal self-contingency of spatial orientation. Thus these mothers not only loomed, but they did so in a less predictable way. Both may be threatening to infants and might exacerbate the infant’s difficulty in predicting these maternal behaviors.

Touch Dysregulation in Future Disorganized Attachment Dyads

Future disorganized (vs. secure) infants spent less time in touch of any kind (touching own skin, an object, mother), and less time specifically touching their own skin, indicating a lowered access to self-soothing through touch. They also showed a heightened self-contingency of touch, specifically a higher probability of staying in the state of “no touch.” Thus, metaphorically, infants became “stuck” in states of not touching.

Moreover mothers of future disorganized (vs. secure) infants lowered their touch coordination with infant touch. They were less likely to use infant increases in touch behavior as a signal for more affectionate touching (and vice versa). This lowered maternal touch contingency, a maternal “withdrawal” from touch coordination, disturbs infant interactive efficacy in the tactile modality. These findings constitute a reciprocal mother and infant tactile dysregulation: the infant is less able to use his own touch, and the mother does not follow the infant’s touch pattern.

Gender Differences in Future Disorganized Infants

Male infants were overrepresented in future disorganized infants, consistent with the literature. Boys, as opposed to girls, are more likely to develop insecure attachments (Murray, Fiori-Cowley, Hooper, & Cooper, 1996). Moreover, male infants are more emotionally reactive than female (Weinberg, Tronick, Cohn, & Olson, 1999), so that they may be more vulnerable to a disorganized form of insecurity.

Future Disorganized Infants: Origins of “Internal Working Models”

We turn now to the implications of our results for the origins of internal working models of attachment in future disorganized infants. The recurrent nature of the infant’s experiences leads to the development of procedural representations or “working models” of self and others that influence the infant’s emotional experiences and expectations (Beebe & Lachmann, 2002; Bowlby, 1973; Bretherton & Munholland, 1999; Main, Kaplan, & Cassidy, 1985; see Beebe & Lachmann, 2012, Paper I). We propose that 4-month infant procedural expectancies of self- and interactive contingency, and of specific behavioral qualities, provide ways of defining the origins of working models of attachment in future disorganized, compared to future secure, infants. Although we conceptualize this internal working model in future disorganized infants in general, the picture we describe below is more characteristic of male infants. Mothers of future disorganized infants bring their own difficult attachment histories, and fears regarding intimate attachments, that may involve unresolved mourning or abuse, and difficulties managing their own distress (Main & Hesse, 1990).

There are many forms of intrapersonal and interpersonal conflict, intermodal discordance, or contradiction in our findings. We use an ethological definition of conflict, in which behavior is organized simultaneously in opposing directions, rather than a psychoanalytic definition of conflict as wish and defense. The internal working models of future disorganized infants are characterized by expectancies of emotional distress and emotional incoherence, difficulty predicting what will happen both in oneself and in one’s partner, disturbance in experiences of recognition, and difficulty in obtaining comfort. Our results identify the elusive details of anomalous parenting in the development of disorganized attachment that have been difficult to identify in previous research (see Madigan et al., 2006).

There are many ways in which maternal contingent coordination with infants is intact in mothers of future disorganized infants. These mothers do not have a general confusion, an overall failure of empathy, or a failure to register or read infant states. Using our three “principles of salience” (see Beebe & Lachmann, 2012, Paper I), *ongoing regulation* is intact in many areas, with the important exceptions of maternal contingent coordination with infant engagement and with infant touch, discussed next.

Instead, many of the difficulties of mothers of future disorganized infants are organized by the principle of *heightened affective moments* (see Beebe & Lachmann, 2012, Paper I). These are moments of contradictory behavior patterns, triggered especially by infant distress. We will develop the argument that mothers of future disorganized infants have unresolved fears about intimate relating, and fears of being retraumatized by infant distress, which are most likely out of awareness. Thus, at moments of infant distress, these mothers mobilize complex contradictory behaviors that derail their infants (K. Lyons-Ruth, personal communication, October 17, 2008). The infant’s distress may be so overarousing and terrifying to these mothers that they repeat aspects of their own childhood feelings through procedural action-sequences, or protect themselves against reexperiencing them (M. S. Moore, personal communication, July 2, 2007). Finally, we will propose that our results provide specific ways of defining *how* the infant’s ability to “know” and be “known by” the mother’s mind, as well as the infant’s ability to “know” his own mind, may become disturbed (see Paper I, Beebe & Lachmann, 2012).

Infant Distress and Discrepant Affect

Future disorganized infants show more vocal distress and combined facial/vocal distress. They also show moments of discrepant negative and positive affect in the same second (such as whimper with smile), illustrating the principle of heightened affective moments. Infant simultaneous positive and negative affect at 4 months provides a strong parallel to simultaneous approach-avoid behavior at 12 months in the Strange Situation. Discrepant affect disturbs the usual intermodal redundancy in communication (Bahrck & Lickliter, 2002) and suggests affective conflict, confusion, and struggle, a striking infant affective dysregulation.

This infant pattern of simultaneous positive and negative affect fits an ethological definition of conflict. For example, one future disorganized infant joined maternal smiles with smiles of his own, but meanwhile he continued to whimper as his mother pushed his head back and roughly smacked his hands and feet together. This discrepant state of affairs may reflect the infant's need for facial affective contact with mother, despite being vocally affectively distressed by mother's rough handling. Discrepant affect may make it difficult for future disorganized infants eventually to know what they feel, or to integrate conflicting feelings. Discrepant affect at 4 months predicts contradictory approach/ withdrawal behavior at 12 months in the Strange Situation, which then predicts later contradictory/ unintegrated mental processes, particularly dissociative processes, in young adulthood (Dutra, Bureau, Holmes, Lyubchik, & Lyons-Ruth, 2009; Lyons-Ruth, 2008).

Dyadic Affective Conflict: Maternal Smile/Surprise to Infant Distress

Not only the infant but also the dyad is in affective conflict. Mothers of future disorganized (vs. secure) infants are likely to show smiles or surprise faces during infant distress moments: an emotional "denial" of infant distress. Thus mothers of future disorganized infants "oppose" or "counter" infant distress, literally going in the opposite affective direction, as if attempting to "ride negative into positive." This finding illustrates the principle of *heightened affective moments*, and can also be construed as a disruption, without repair. Moreover, the infant's expectation of matching and being matched in the direction of affective change, which ordinarily lays the groundwork for feeling "known" or "on the same wavelength" (Beebe & Lachmann, 1988), is disturbed. We propose that the intrapersonal discrepant affect of future disorganized (vs. secure) infants is in part fueled by seeing their mothers' positive facial affect while they themselves are distressed. Mothers show the affective discrepancy interpersonally; infants show the affective discrepancy intrapersonally (J. Cassidy, personal communication, October 23, 2006).

Mothers certainly perceive infant distress, reflected in comments such as, "Don't be that way," or "You don't want to be like that," or "No fussing, no fussing, you should be very happy." Instead of postulating that mothers of future disorganized infants do not register infant distress, we propose that their ongoing unresolved fears about intimate relating trigger complex and contradictory behavioral tendencies that derail the infant (K. Lyons-Ruth, personal communication, October 17, 2008).

We infer that this maternal "countering" of infant distress confuses future disorganized infants and contributes to their distress. Infants are left with an incoherent dyadic configuration which cannot be integrated. It is difficult for infants to feel that their mothers sense and acknowledge

their distress. We infer that infants instead come to *expect* that they cannot count on their mothers to empathically share their distress.

Malatesta, Culver, Tesman, and Shepard (1989) have previously documented that maternal facial responses of “positive,” “surprise,” or “ignore” to infant facial distress (sad face, pain face) predicted a toddler affective style of attempting to dampen negative affect. We conjecture that disorganized infants as toddlers may have a similar preoccupation with attempts to manage negative affect.

Dyadic Conflict: Attention Dysregulation

A second form of dyadic conflict can be seen in the finding that, despite the greater facial/vocal distress of future disorganized (vs. secure) infants, their mothers showed excessive looking away from the infant’s face (20% of the time or more), which may reflect moments of dissociation (G. Downing, personal communication, April 18, 2007). Mothers of future disorganized infants also lower their gaze “self-contingency,” the predictability of their gaze rhythms of looking at and away from the infant’s face. Future disorganized infants may have difficulty coming to rely on predictable patterns of maternal visual attention, which may lead to feelings of not being “seen.” These infants are too visually “separate” from their mothers, and they may become confused about mother’s visual presence and availability.

This attention dysregulation may reflect maternal discomfort with intimate engagement through mutual gaze, a visual intimacy (K. Lyons-Ruth, personal communication, January 12, 2007). If the mother of the future disorganized infant looks at her distressed infant, similar levels of distress may be activated in her. Looking away may reflect a maternal attempt to down-regulate arousal (J. Cassidy, personal communication, October 23, 2006; see Hodges & Wegner, 1997).

Maternal Intermodal Discordance

Mothers of future disorganized (vs. secure) infants themselves exhibited a conflict or intermodal discordance between attention, where mothers gazed away extensively, and thus were “too far away;” and spatial orientation, where mothers loomed “too close in.” These mothers may reveal their desire for contact by looming (K. Lyons-Ruth, personal communication, January 12, 2007); or looming may also be a reflection of the mother’s need for control over the contact (M. S. Moore, personal communication, July 2, 2007). Both maternal looking away and looming in disturb the potential for mutual gaze. Because eye-to-eye contact is arousing, both these behaviors may be maternal ways of dealing with concerns about visual intimacy, which may be overarousing for these mothers.

Maternal excessive gazing away and excessive looming both occurred in the context of lowered maternal self-contingency. This lowered predictability further exacerbates infant difficulty in decoding and anticipating maternal behavior, decreasing the infant’s sense of agency, and increasing the likelihood that the infant may feel unsafe (M. S. Moore, personal communication, July 2, 2007). It will be difficult for the infant to generate a coherent percept from the contradictory visual-spatial maternal discordance coupled with lowered maternal self-predictability. Both infants and mothers will have difficulty sensing what the mother feels and what she will do next. Is she or isn’t she coming in to loom? Is she or isn’t she “going away” visually, or “coming back”?

Dyadic Conflict: Lowered Maternal Engagement Coordination

A third form of dyadic conflict can be seen in the following: despite the greater distress of future disorganized infants, their mothers lowered their facial-visual engagement coordination with infant facial-visual engagement. This pattern is a maternal emotional/attentional withdrawal from contingently coordinating with infant emotional/attentional “ups and downs,” a difficulty coordinating with infant positive as well as distress moments. They did not join the infant’s attentional/affective direction, disturbing shared states (see Paper I, Beebe & Lachmann, 2012, Paper I; Lyons-Ruth, 2008). We found no difference in the prevalence of positive or negative faces in mothers of future disorganized (vs. secure) infants. Instead, the difference was found in the ways that mothers *contingently coordinated* their facial-visual behavior with those of the infants: the *process* of relating, rather than the content of behavior.

This maternal emotional/attentional withdrawal makes it difficult for future disorganized (vs. secure) infants to come to expect that they can influence their mothers to coordinate with their distressed as well as positive moments and disturbs infant interactive efficacy. We infer that these infants come to expect that their mothers do not “sense” and empathically “join” their facial-visual engagement states. This lowered infant interactive efficacy may be fear-arousing, particularly in the context of distress. Lowered ability to “influence” may be related to the finding that later in development disorganized infants have overcontrolling styles (Lyons-Ruth & Block, 1996; Main et al., 1985).

In many ways mothers of future disorganized infants are adequately responsive. When facial and gaze behavior were analyzed separately, maternal facial-mirroring and maternal gaze coordination with infant gaze were intact in these mothers. This fact is crucial in our argument that mothers of future disorganized infants *perceive* the infant’s affect and gaze behavior. It is only when the overall “gestalt” of infant *facial-visual engagement* (which includes infant head orientation/vocal affect) is considered that we find lowered maternal contingent engagement coordination. Thus, maternal mirroring of the entire gestalt of infant facial-visual engagement is not intact.

Our finding of maternal emotional withdrawal (lowered engagement coordination) parallels that of Lyons-Ruth’s (2008) finding that maternal emotional withdrawal from the infant’s attachment-related cues at 12 months was the best predictor of adult borderline and conduct symptoms. Such maternal withdrawal may disturb the developing child’s ability to share attentional, affective and mental states with others (Lyons-Ruth, 2008).

We interpret the maternal lowered contingent engagement coordination with infant engagement, as well as maternal smile/surprise to infant distress, as maternal emotional “denial” of distress in future disorganized dyads. Although minimization of distress has been associated with avoidant attachment styles (Cassidy & Berlin, 1994; Cassidy & Kobak, 1988), the forms of maternal denial of distress documented here are different from minimization. Lowered contingent emotional coordination communicates to the infant, “You can’t affect me.” Showing the opposite (positive) emotion to the infant’s negative emotion constitutes an “opposing” of the infant’s emotion, communicating: “I’m not going there.” We infer that mothers of future disorganized infants cannot coordinate with infant facial-visual engagement “ups and downs,” and cannot acknowledge moments of infant distress, because they cannot bear to pay attention to their own emotion distress, and their own distress may be evoked by the infant’s distress.

Heightened Maternal Facial Self-Contingency: “Closing Up One’s Face”

Lowered maternal engagement coordination was accompanied by heightened maternal facial self-contingency. Mothers of future disorganized (vs. secure) infants remain overly facially stable, too “steady-state,” like a momentary “still-face” (see Tronick, 1989). Mothers thus “close up their faces,” which is another way of not being available to the “play of faces,” another way of saying, “You can’t affect me.”

Mothers of future disorganized infants may sense the risk of greater facial variability, which would facilitate greater facial coordination with the infant’s facial affect. Clinically we observed that this maternal “closing up” of her face often occurred at moments of infant distress, as if mother is “going blank.” If she remained empathic to infant distress, she might fear finding herself in the original traumatized state of her own history. By momentarily closing her face, and lowering her coordination with the infant’s emotional ups and downs, she may be shutting herself down in a self-protective effort, possibly dissociative (M. S. Moore, personal communication, July 2, 2007). For example, as one future disorganized infant sharply vocalized distress and turned his head away abruptly with a pre-cry face, the mother’s head jerked back, as if “hit” by the infant’s distress; she then looked down with a “closed-up” face.

If her procedural experience could be put into words, the mother of the future disorganized infant might feel, “I can’t let myself be too affected by you. I’m not going to let myself be controlled by you and dragged down by your bad moods (K. Lyons-Ruth, October 17, 2008). I refuse to be helpless. I’m going to be upbeat and laugh off your silly fussing.” She might feel, “I can’t bear to know about your distress. Don’t be like that. Come on, no fussing. I just need you to love me. I won’t hear of anything else. You should be very happy.” And she might feel, “Your distress frightens me. I feel that I am a bad mother when you cry” (E. Shane, personal communication, November 12, 2006). Or she might feel, “Your distress threatens me. I resent it. I just have to shut down” (M. S. Moore, personal communication, July 2, 2007).

We propose that future disorganized infants may experience the combination of maternal withdrawal of engagement coordination, and “too-steady” faces, as a kind of affective “wall.” Maternal positive faces, specifically at moments of infant distress, further connote a “stonewalling” of infant distress. This active maternal emotional refusal to “go with” the infant, to join infant distress, disturbs the infant’s ability to feel sensed. We infer that future disorganized infants come to expect that their mothers will not “join” their distress with acknowledgments such as maternal “woe face,” an empathic form of maternal facial mirroring. Instead infants come to expect that their mothers seem happy, surprised, or “closed up” when they are distressed.

Extensive looking away, less predictable looking patterns, moments of “closing up” one’s face, and lowered contingent engagement coordination with infant engagement all suggest that mothers of future disorganized infants may, out of awareness, be afraid of the intimacy that would come from more gazing at the infant’s face, more coordination with the infant’s facial-visual shifts, and more “joining” the infant’s distressed moments. We conjecture that these mothers cannot process emotional information in the moment because they are flooded by their experience of the infant’s distress, which may reevoke an earlier traumatic state of their own. They may shut down their own emotional processing and be unable to use the infant’s behaviors as communications, in a momentary dissociative process (M. S. Moore, personal communication, July 2, 2007). These

findings confirm and extend Lyons-Ruth's (2008; Lyons-Ruth et al., 1999) proposals that mothers of disorganized infants engage in disrupted and contradictory forms of affective communication, especially around the infant's need for comfort when distressed.

Lowered Infant Engagement Self-Predictability: Infant "Destabilization"

In the context of lowered maternal engagement coordination, future disorganized (vs. secure) infants showed lowered engagement self-predictability, a less stable rhythm of facial-visual behaviors. The infant's ability to anticipate his or her own moment-to-moment action tendencies is lowered. We infer a decreased sense of self-familiarity and coherence over time, metaphorically feeling "destabilized." This infant engagement destabilization is interpreted as an adjustment to the maternal failure to adequately coordinate her engagement with infant engagement, an infant intrapersonal dysregulation linked to a maternal interpersonal dysregulation.

Dyadic Touch Dysregulation

Mothers of future disorganized (vs. secure) infants not only lowered their engagement coordination with infant engagement, but also lowered their touch coordination with infant touch. These two maternal patterns disturb infant interactive efficacy in the engagement and touch realms. Compared to mothers of future secure infants, mothers of future disorganized infants did not acknowledge increasing infant touch as a cue for more affectionate, tender maternal touch. This is a new finding, that infant-initiated touch enters the interpersonal exchange, functioning as a communicative signal for mothers of future secure infants (G. Downing, personal communication, October 26, 2006). Perhaps the lowered touch coordination in mothers of future disorganized infants reflects difficulty tolerating an infant behavior that reflects self-soothing, because of the mothers' own difficulties with distress. We infer that future disorganized infants come to expect that their mothers will be unavailable to help modulate moments of affective distress through touch coordination with their own touch behaviors. Infants are left too alone, too separate, in the realm of touch (A. Bergman, personal communication, November 16, 2006).

Simultaneously future disorganized infants themselves showed a touch dysregulation: (a) less touch across all codes (touching object, mother or own skin); (b) specifically less touching of their own skin; and (c) greater likelihood of continuing in states of "no touch," metaphorically, getting "stuck" in states of "no touch" and unable to rely on themselves to provide self-comfort through touch. This configuration depicts an infant intrapersonal dysregulation linked to a maternal interpersonal dysregulation, a *dyadic touch dysregulation*.

We know from our findings that future disorganized infants are highly distressed, and from previous work (Spangler & Grossmann, 1993) that they have heightened physiological arousal. These interpersonal and intrapersonal forms of touch dysregulation compromise infant interactive efficacy and self-agency, in the capacity to self-soothe through touch. Getting "stuck" in states of no touch may disturb the infant's visceral bodily feedback, laying one groundwork for later dissociative symptoms as young adults (Dutra et al., 2009; Lyons-Ruth, 2003, 2008).

The dyadic touch dysregulation of future disorganized infants and their mothers illustrates a disturbance in the interaction pattern of “dyadic state transforming,” the expectation of being able to transform an arousal state through the contribution of the partner (Stern, 1985; see Paper I, Beebe & Lachmann, 2012, Paper I). As a corollary, the infant findings of less touch and less touching one’s own skin, in the context of greater vocal distress, illustrate a disturbance in an infant “intrapersonal state transforming,” the expectation of being able to help oneself transform arousal states. Future disorganized infants thus come to expect that they are relatively helpless to affect mothers, in the realms of both facial-visual engagement and touch. They are left too alone to manage their distress on their own. They come to expect that they cannot help themselves by providing touch self-comfort and touch modulation of vocal distress.

If their procedural experience could be put into words, we imagine future disorganized infants might experience, “I’m so upset and you’re not helping me. I’m smiling at you and whimpering; don’t you see I want you to love me? When I’m upset, you smile, or close up your face, or look away. You make me feel worse. I feel confused about what I feel and about what you feel. I can’t predict you. I don’t know what is going on. What am I supposed to do? I feel helpless to affect you. I feel helpless to help myself. I feel frantic.”

Altered infant self-contingency represented half of all contingency findings (combined mother and infant) in future disorganized (vs. secure) dyads. We thus consider the infant self-contingency findings in touch (greater likelihood of continuing in “no touch” states) and engagement (facial-visual destabilization) to be important aspects of the experience of future disorganized infants. These self-contingency findings generate difficulties in sensing, predicting, and modulating one’s own state. Thus infant intra-personal forms of dysregulation accompany the overt emotional distress of future disorganized infants, and the maternal failures to acknowledge and respond to this distress.

Procedural Mechanisms of Sensing the State of the Other

In an effort to understand further the communication of mothers of future disorganized infants, we address the topic of procedural mechanisms of sensing the state of the other (see Paper I, Beebe & Lachmann, 2012, Paper I). A facial expression produced by one person tends to evoke a similar expression in the partner, out of awareness (Dimberg, Thunberg, & Elmehed, 2000), a powerful way of participating in the state of the other. This is such a robust phenomenon that some researchers dub it an “automatic” facial mimicry (Hatfield, Cacioppo, & Rapson, 1993; Hodges & Wegner, 1997). But as we have seen, mothers of future disorganized infants do not match (or join, via “woe = face”) the facial distress of their infants.

Furthermore, we know from adult research that as partners match each other’s affective patterns, each recreates a psychophysiological state in the self similar to that of the partner, an additional way of participating in the subjective state of the other (Beebe & Lachmann, 2002; Ekman, Levenson, & Friesen, 1983). Evidently this further layer of information about the infant’s state also cannot be used by mothers of future disorganized infants. Thus these mothers are highly unusual. They do not operate in accordance with what is known about the behavioral and physiological organization of emotional communication. We propose that these means of sensing the state of the other, highly biologically primed, are inhibited for self-protective reasons (V. Demos, personal communication, March 3, 2007). In addition, the ways that these mothers

process emotional communication may be altered from their own stressful development, which likely involves a history of unresolved loss or trauma (Main & Hesse, 1990).

Knowing and Being Known

What is at stake in these early working models is the organization of intimate relating, which entails the fundamental issue of how the infant comes to know, and feel known by, another's mind (Beebe & Lachmann, 2012, Paper I). A number of authors (see Lyons-Ruth, 2008; Meltzoff & Moore, 1998; Sander, 1977; Stern, 1985; Trevarthen, 1998; Tronick, 1989) have argued that the infant's perception of correspondences (in time, form, and intensity) between his own behavior and that of the partner provides the infant with a means of sensing the state of the partner, and of sensing whether the state is shared or not. These correspondences have been variously described as "changing with" and "affect attunement" (Stern, 1985), a resonance based on "matched specificities" (Sander, 1977), being "on the same wavelength" (Beebe & Lachmann, 2002), "a fundamental relatedness between self and other" (Meltzoff & Moore, 1998), and "mutually sensitive minds," or "immediate sympathetic contact" (Trevarthen, 1998). These correspondences facilitate the development of infant agency, coherence, and identity (Sander, 1977; Stern, 1985; Trevarthen, 1998). Although disturbances in affective correspondences, leading to infant difficulty in sensing shared states, is usually considered to be central in the infant's ability to know and be known by the mother's mind, in this study we also found disturbances in spatial, touch, and attention patterns.

We propose that future disorganized infants have difficulty in knowing, and feeling known by, their mothers' minds, as well as difficulty in knowing their own minds. The findings that we have presented allow us to describe *how* this difficulty operates.

We propose that the future disorganized infant will have difficulty *feeling known* by his mother (a) in moments when he is distressed and she shows smile or surprise expressions: Stern's (1985) moments in which the infant learns that his distress states are not shareable, which may accrue to later "not-me" states; (b) in moments when the mother looks away repeatedly and unpredictably, so that he does not feel reliably *seen*; (c) as the mother does not coordinate with his facial-visual engagement, in both positive and distress directions, so that he comes to expect that his mother does not follow what he feels and where he looks; (d) as his mother does not coordinate her affectionate-to-intrusive touch patterns with his frequency of touch, generating infant expectations that his mother does not follow him in his touch patterns by becoming more affectionate as he touches more (and vice-versa); and (e) by clinical observation, as mothers do not seem curious about, and make no efforts to repair these powerful disruptions, suggesting maternal difficulty thinking about the infant's mind and motivation (Fonagy, Gergeley, Jurist, & Target, 2002).

We propose that the future disorganized infant will have difficulty *knowing* his mother's mind (a) as he has difficulty integrating mother's discrepant smile/surprise face to his distress into a coherent percept; (b) as he has difficulty predicting mother's looking pattern: whether she will look or look away, and for how long; (c) as he has difficulty predicting mother's spatial orientation: whether she will sit upright, lean forward, or loom in, and when; (d) as she "closes up" her face and becomes inscrutable; (e) as mother's lowered contingent engagement coordination makes it difficult for the infant to "influence" her with his facial-visual engagement, to predict what she will do next, leading to expectations that mother does not join his direction

of attentional/affective change; and (f) as the mother's lowered contingent touch coordination makes it difficult for the infant to "influence" her with his own touch behaviors, to predict what she will do next, leading to an infant expectation that mother does not "follow" his touch behaviors, by touching him more affectionately as he touches more (and vice versa).

We propose that the future disorganized infant will have difficulty *knowing himself* (a) in his moments of discrepant affect, for example as he smiles and whimpers in the same second; (b) as his own engagement self-contingency is lowered, making it more difficult to sense his own facial-visual action tendencies from moment-to-moment, and more difficult to develop a coherent expectation and possibly sense of ownership (see Stolorow, 2008) of his own body; and (c) as he has difficulty touching, specifically touching his own skin, and as he gets "stuck" in states of "no touch." These touch patterns disturb his visceral feedback through touch, and disturb his own agency in regulating distress through touch. As Sander (1977) noted, infant inner experience is organized in the interactive context. Sander argues that the infant-caretaker system constructs a unique facilitation of, and constraint on, the infant's access to and awareness of his own states, his initiative to organize his own states, and his ability to use his states in further organizing his own behavior. We propose that the future disorganized infant experiences a disturbance of agency with regard to his own states.

As we noted in Paper I (Beebe & Lachmann, 2012, Paper I), Lyons-Ruth (1999, 2008) proposed that the outcome of the process of coming to know and feel known by another's mind is dependent on whether the partner is capable of a *collaborative dialogue*. Overall, mothers of future disorganized infants do not generate collaborative dialogues. Their infants will be unlikely to generate internal working models in which both partners are represented as open to the full range of experiences of the other. Lyons-Ruth (1999, 2008) also suggested that failures of collaborative dialogue generate contradictory internal models. An example in our data of a contradictory procedure which generates a contradictory internal model is infant discrepant affect, whimpering and smiling in the same second. This pattern may generate an infant internal working model such as, "I smile to meet your smile, while I whimper to protest your uncomfortable touch." Another example of contradictory procedures are moments where infants are distressed but mothers smile or look surprised, possibly generating infant internal working models of "While I am upset, you are happy," or "You are surprised that I am upset." Contradictory procedures, intrapersonal or dyadic, disturb the ability to know and be known by the partner, and to know oneself. They also disturb higher order coordinations essential to social and cognitive development (Lyons-Ruth, 1999). Moreover, they set the stage for later dissociative defenses in early adulthood in which contradictory arenas of knowledge are entertained.

Internal Working Models of Future Disorganized Infants

We argue that future disorganized infants represent these individual and dyadic patterns as internal working models in the form of procedural self- and interactive expectancies (see Beebe & Lachmann, 2002). These expectancies presumably bias the trajectory of how experience is organized, activating certain pathways and inhibiting others, ultimately limiting the range, flexibility and *coherence* of individual and social experience.

One central feature of these expectancies is intense infant emotional distress and the inability to obtain comfort. In many ways future disorganized infants are alone with their distress, helpless

to affect their mothers with their distress, and at critical moments of distress, they are opposed by their mothers. A second feature may be an expectancy of difficulty in predicting what will happen next, in oneself and in one's mother. A third feature is difficulty in knowing what one feels and what the mother feels: a form of emotional incoherence (L. Reicher, personal communication, February 1, 2007; Teicholz & Kriegman, 1998). A fourth feature is the expectation of not feeling "sensed" or "known," particularly when distressed. These future disorganized infants do not experience Sander's (1977) "moment of meeting," a match between two partners such that the way one is known by oneself is matched by the way one is known by the other (L. Reicher, personal communication, February 1, 2007). They come to expect that their distress states are not shareable (Stern, 1985). A fifth feature is the presence of intrapersonal and dyadic contradictory communications, conflict, and remarkable intermodal discrepancies. These contradictions disturb the coherence of the infant's internal working model. We suggest that future disorganized infants, like all infants, will come to know the roles of both partners (Beebe & Lachmann, 2002). This may account for the observation that, later in development, the disorganized attachment child plays out the mother's role of denial of distress, overriding the state of the mother, in a controlling style in which the child's state dominates over the adult's state. We note that our view of infant procedural representations assumes the potential for reorganization and transformation of representations (Beebe & Lachmann, 2002; Sameroff, 1983). Under what conditions inner working models of 4-month infants might shift is a topic for future research.

In sum, we have described many fundamental disturbances in the processes through which infants may come to feel known and can recognize being recognized, through which infants may come to know their mothers, and through which infants come to sense their own states. This picture provides detailed behavioral mechanisms that could result in the lack of a consistent strategy of dealing with negative emotions, the hallmark of disorganized infants in the Strange Situation by 12 months (Van IJzendoorn, Schuengel, & Bakerman-Kranenburg, 1999). The disturbance in individual and dyadic emotional coherence in future disorganized infants and their mothers offers a striking parallel to the contradictory and unintegrated affective evaluations of attachment relationships in the Adult Attachment Interview findings of disorganized mothers, and it sets the stage for dissociative adaptations in young adulthood.

Limitations

The study is limited by its exclusive examination of behavioral transactions between mothers and infants in the 4-month face-to-face encounter as predictors of attachment. Considerations of sleep-wake and feeding cycles, maternal states of mind and personality features, infant temperament, physiological correlates, and possible genetic contributions, lie outside our scope. However we note that measures of maternal anxiety and depression were uncorrelated with attachment.

SUMMARY

Our central contribution is a greater specification of essential 4-month mother-infant communication processes that predict 12-month disorganized attachment outcomes. Whereas attachment research has focused on maternal antecedents, particularly the concept of maternal "sensitivity" (de Wolff & van IJzendoorn, 1997), maternal sensitivity does not predict disorganized attachment.

Our microanalysis of infant as well as maternal behavior was critical in generating a dyadic view of these early communication disturbances which did predict disorganized attachment. Much attachment theory emphasizes adequate affect regulation as key to the origins of security. In contrast, all communication modalities examined, affect, attention, orientation, and touch, made unique contributions to our understanding of the origins of disorganized versus secure attachment. We documented a complex dyadic systems view of the roles of both partners, and the roles of both self- and interactive contingency, in the co-construction of attachment disorganization. The analysis of different communication modalities allowed us to identify striking intermodal discrepancies or conflict, both intrapersonal and interpersonal, that characterized future disorganized dyads. The remarkable specificity of our findings has the potential to lead to more finely focused clinical interventions.

We identified specific ways in which the future disorganized infant represents *not being sensed and known* by his mother, and *confusion in sensing and knowing himself*, especially at moments of distress. The future disorganized infant has difficulty *feeling known* by his mother, difficulty *knowing* his mother's mind, and difficulty *knowing himself*. In conclusion, the findings suggest that the emerging internal working models of future disorganized infants set a trajectory in development which may disturb the fundamental integration of the person.

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