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Greg Moran

University of Western Ontario, gmoran2@uwo.ca

David Pederson

University of Western Ontario, pederson@uwo.ca

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**FROM MATERNAL REPRESENTATIONS TO THE FIRST RELATIONSHIP
BY WAY OF MATERNAL SENSITIVITY:
A RECONCEPTUALIZATION OF THE DEVELOPMENTAL MODEL**

Greg Moran and David Pederson

Department of Psychology
The University of Western Ontario
London, Ontario
CANADA N6A 5C2

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FROM MATERNAL REPRESENTATIONS TO THE FIRST RELATIONSHIP BY WAY OF MATERNAL SENSITIVITY: A RECONCEPTUALIZATION OF THE DEVELOPMENTAL MODEL

In her now classic study, Ainsworth (Ainsworth, Bell, & Stayton, 1971; Ainsworth, Blehar, Waters, & Wall, 1978) carefully observed 23 mothers and infants in their homes over the infants' first year and related these observations to the classification of the relationship as assessed in the Strange Situation at 51 weeks. The home observations consisted of four-hour visits every 3 weeks resulting in over 70 hours of observation time per dyad. The observers took extensive notes that were focussed on the infants' signals for comfort, contact, and interaction and the nature of the mothers' responses to these signals. Ainsworth found that, when observed in a variety of contexts in the home over the first year, mothers in secure relationships as assessed in the Strange Situation were more sensitive to their infants' signals --- "noticing them, interpreting them accurately, and in responding to them promptly and appropriately" (Ainsworth, et al, 1971, p 40). These observations led Ainsworth and her colleagues to propose the maternal sensitivity hypothesis, namely that maternal sensitivity was the major if not exclusive source of the infant's attachment security. A rating scale of sensitivity designed by Ainsworth to summarise the home observations from the fourth quarter of the first year distinguished secure from non-secure dyads with an effect size equivalent to a correlation of .78 (Goldsmith & Alansky, 1987). These early results fostered an assumption that was to become a pervasive influence on research in attachment — that parental sensitivity is the predominant developmental determinant of a secure relationship between the infant and parent.

This initial hypothesis involving a causal link between maternal sensitivity in early interaction and the nature of attachment relationship was broadened into a more comprehensive developmental model as research and theory moved into the domain of adult cognitive representations in the latter part of the 1980's (Main, Kaplan, & Cassidy, 1985). Bretherton (1985) challenged researchers to expand on Bowlby's original conceptualization of attachment theory by developing predictions regarding the relation of distinctive patterns of mothers' representations of intimate relationships to her style and behaviour as a mother and, thus, to the development of the attachment relationship. George, Kaplan, and Main (1985) made the empirical evaluation of such issues a real possibility with the development of a semi-structured interview, the Adult Attachment Interview, capable of distinguishing theoretically

coherent patterns of maternal representations (Main, et al., 1985; Main & Goldwyn, 1998). Research quickly established a robust and reliable association between assessment of maternal states of mind using the Adult Attachment Interview and classifications of mother-infant relationships in the Strange Situation. A comprehensive metaanalysis of existing studies of this association revealed a correlation of .47 between autonomy assessed with the Adult Attachment Interview and security in the Strange Situation (van IJzendoorn, 1995).

Although not explicitly predicted in its original formulation, such a robust empirical association between a mother's representations of intimate relationships and the quality of her relationship with her infant is consistent with attachment theory, as Bretherton (1985) so ably demonstrated in her extension of the theory to the level of mental representation. Furthermore, the theory also predicts that this association reflects a developmental process whereby a mother's representations are determinants of her sensitivity in interaction with her child and that these interactions, in turn largely determine the character of their relationship. This model is illustrated in Figure 1.

The results of two recent meta analytic reviews of research by van IJzendoorn (1995; De Wolff & van IJzendoorn, 1997) have raised considerable doubts about this depiction of the role of maternal sensitivity in the mediation of the link between maternal cognitions and attachment security. In the first review, van IJzendoorn (1995) examined the hypothesis that sensitivity is the mediator accounting for the substantial relation between attachment representations as assessed by the Adult Attachment Interview and security of attachment assessed in the Strange Situation. He concluded that although sensitivity was related to both variables, the mediated path accounted for less than 25% of the direct association between the parent's attachment representations and the infant's attachment security. Additional factors are needed to account for the influence of the parent's attachment representations on the attachment relationship formed with the infant. A second more direct blow to the maternal sensitivity hypothesis came from the De Wolff and van IJzendoorn (1997) meta analytic review of research on maternal behavior and attachment security which concluded that the average effect of maternal sensitivity was equivalent to a correlation of .22. Although they argued that their review substantiated the hypothesis that sensitivity was an important correlate of security, we are impressed with weakness of this association, especially relative to the correlation of .78 found by Ainsworth in her foundational study.

The anomaly posed by these reviews can begin to be reconciled if we accept that the meaningful assessments of maternal sensitivity is at least as daunting a task as the assessment of other attachment constructs (Pederson & Moran, 1996). It is well recognised that training and an assurance of coder reliability are necessary for valid coding of the Ainsworth Strange Situation (Carlson & Sroufe, 1993). Even more extensive training in order to achieve a high level of coder reliability assurance is expected

with the Adult Attachment Interview (Main & Goldwyn, 1998). In this chapter we reflect on our experience in assessing maternal sensitivity. The sometimes circuitous methodological route that has brought us to our current assessment techniques included a number of instructive cul-de-sacs that may be of interest to others seeking effective guidelines for the description of interactive behaviour.

Adventures in the Description of Maternal Sensitivity

Our first wrong turn appeared at first to promise a direct route to our goal. In the initial study of attachment in our research group (Smith & Pederson, 1988), we observed mothers interacting with their infants following participation in the Strange Situation. We asked each mother to complete a questionnaire while at the same time removing all toys from the room in order to observe her management of the competing tasks posed by her infant's behavior and the questionnaire. We were successful in identifying what appeared to be different strategies associated with the three attachment classifications. Mothers in secure relationships were more responsive to their infant's cues. Mothers in ambivalent relationships ignored their infants' fusses and bids for attention and mothers in avoidant relationships seemed to respond independent of the infants' cues. Although this was a robust finding that was subsequently replicated in Phil Smith's doctoral dissertation (Smith, 1988), we quickly realized that the approach had left us further from our original objective than we had expected. That is, although there was some satisfaction in being able to predict attachment categories from independent observations, our real goal in observing maternal behavior has from the outset been to better understand its formative role in the development of the first relationship. Because of the substantial constraints on the mother and the barren laboratory environment, the "questionnaire situation" lacked the degree of ecological validity that would provide the results needed to speak to this more theoretically driven objective.

The next detour on this voyage of discovery can be illustrated by our experience with the Brannen twins. They and their mother were participants in a study on stress, maternal sensitivity, and attachment (Pederson, Evans, Chance, Bento, & Fox, 1988). We used a coding system that was an extension into the context of the home of the contingency based system developed in the laboratory "questionnaire situation." We found that when the mother's interactions with Twin A were the focus of our observations, she appeared very attentive and responsive and ignored Twin B. In spite of our efforts to be subtle about the change in the target of our observations, the opposite happened when we switched our focus to Twin B. Thus Mrs Brannen was markedly less responsive to the activity and needs of the twin whose interactions were not receiving our immediate attention. Her interactive style closely followed our sampling pattern. Of course our mistake was that we did not take seriously what everyone knows about naturalistic observations, i.e., the presence of the observer alters behavior in unknown ways (Colins,

1996). Mary Ainsworth's solution to this problem was to have very friendly visitors make repeated visits over the first year and thus increase the likelihood that their presence would become a part of the naturalistic context for interaction. Although we believe that such a procedure has many advantages, we simply could not afford her solution. It was therefore important for us to develop a method that duplicated the results of the attention-dividing lab questionnaire procedure and, at the same time, provide ecological validity by including events that simulated the normal context of a busy household. With this in mind, we developed a standard home visiting procedure that is semi-structured and includes a developmental assessment of the infant, the completion of questionnaires and q-sorts by the mother, and interviews. Each visit also includes less structured time.

Inadequacies in the basic structure of our home observations were not the only features that made the study involving the Brannen twins the proverbial "good learning experience." We also substantially underestimated the challenge of assessing sensitivity. Although we found that measures of maternal sensitivity that were based upon behavioral codes and ratings were related to developmental outcomes such as developmental status of the infant at 12 months (Pederson, et al, 1988) and IQ at six years (Robson, 1993), maternal sensitivity was unrelated to Strange Situation attachment classifications at 12 months. In retrospect, it is clear that we placed too much reliance on easily observable characteristics of interactive behavior and on its more superficial features. This point can be illustrated by our experience with Mrs. Robertson and her daughter, Amanda. Mrs. Robertson's dedication to her daughter could not be missed; she provided her child with the most up-to-date toys and age-appropriate pictures covered the walls — she had virtually converted her home into a teaching machine. In conversation with the observer, Mrs. Robertson took real pride in Amanda's achievements through statements that seemed warm and enthusiastic. Amanda, in turn, was an exceedingly bright, sociable 12-month old. The visitors left the visit much impressed with the mother's obvious dedication and commitment to her child and translated this impression directly into high ratings of sensitivity and responsiveness. In the Strange Situation, Amanda snubbed her mother on both reunions and, contrary to our expectations from the home visit, was unquestionably in an avoidant relationship with her mother. Thus our first study in which we attempted to relate home observations to maternal behavior was a sobering experience. We learned that assessing maternal sensitivity was much more difficult than our experience with laboratory procedures (Smith & Pederson, 1988) had led us to expect. In addition to providing more structure to the home visits, our next studies introduced descriptions of both infant and maternal attachment relevant behavior that were based on Q-sort methodology.

We were impressed by Everett Waters' description of q-methods as a potentially powerful tool with which to summarise naturalistic observations of parent-infant interactions (Waters, 1985; Waters &

Deanne, 1985). The q-sort procedure seemed a good compromise between the global ratings of sensitivity developed by Ainsworth and the behavioural checklists we were using. In developing the Maternal Behaviour Q-set, we first studied the 100 items in Waters' original attachment behaviour q-set in order to identify the characteristics of q-set items that provided sufficient specificity to allow observer agreement yet also encouraged a level of inference that demanded that observers use their social-cognitive understanding of the dynamics of the more subtle nuances of parent-infant interaction of the sort that are so well illustrated in the interactions between Mrs. Robertson and her daughter. The q-set items in our new set were written to reflect aspects of maternal sensitivity identified in the literature. Mary Ainsworth's careful description of maternal behaviour and her detailed scales of acceptance, accessibility, cooperation and sensitivity were particularly helpful. We wrote 150 items that sampled a wide variety of maternal behaviour such as child care (e.g., "Balances task and baby's activities during feeding"), affect (e.g., "Seems to resent baby's bids for attention and signals of distress"), availability (e.g., "Arranges her location so that she can perceive baby's signals"), and responsiveness (e.g., "Responds immediately to cries/whimpers"). This pool was reduced to 90 items by eliminating initial items that were redundant, ambiguous, unlikely to be observed, or could not be sorted reliably. Faculty and graduate students who were familiar with home observations and with attachment theory and research used these 90 items to describe a prototypical sensitive mother. This sort became the sensitivity criterion (Pederson & Moran, 1995b). In this and all q-sorts, we used a forced rectangular distribution of 10 items in each of 9 piles with pile 9 for the items most like and pile 1 the items least like the mother. The participant's sensitivity score is the correlation between a q-sort describing her behaviour with the criterion sort of the prototypical sensitivity mother.

In the initial application of the Maternal Behaviour Q-set (Pederson, et al., 1990), we reported moderate inter-observer agreement of sensitivity scores ($\bar{r} = .75$). The sensitivity scores from one observer were correlated .43 with the security scores derived from the Waters' Attachment Q-set conducted by the second observer. The sensitivity scores aggregated over the observers were modestly related to security scores from the mothers' Attachment Q-sort security scores ($\bar{r} = .29$) and robustly related to Attachment Q-sort security scores aggregated over the mothers' and observers' q-sorts ($\bar{r} = .52$).

In parallel with the development of q-sort descriptions for observations in the home, we resumed our search for behavioural descriptions of the contingencies and sequences that may define maternal sensitivity (Symons & Moran, 1994). A study that will probably involve our last attempt to code structurally defined discrete categories of behaviour live in home observations provides yet another instructive, if unproductive, side trip in our quest. For this study, we developed programs for hand held computers to store the events and times of infant and maternal behaviour. Our goal was to apply

sequential analyses to these behavioural streams in order to further understand and define the construct of maternal sensitivity (Moran, Dumas & Symons, 1992). The observers reported considerable difficulty trying to keep up with the coding. To summarise a long year of frustration, not only were the codes internally inconsistent, the interrater reliability of the sensitivity and security q-sort scores plummeted to unacceptable levels. Given the unreliability of the scores, of course we failed to replicate the finding of a robust correlation between sensitivity and security scores. It appears that the task of keeping track of the computer codes distracted the observers from noticing the details of maternal and infant interactive behaviour. The exercise also further reinforced our conviction that observational methods based on structured and systematic inference were far more likely to provide meaningful descriptions of variation in interaction than were more straight-forward behavioural approaches.

As this account indicates, we have made many false starts in our attempts to develop reliable and valid assessments of maternal sensitivity. These experiences, however, have provided us with the lessons needed to develop procedures that are now much closer to the reliable and meaningfully valid assays that we sought. Some of these lessons include: the importance of observing dyads in their natural context; an acute awareness that our presence influences the interactions we strive to study; the need for a standardised but not overly-constrained context for observations; and, the value of training to facilitate an observer's interpretation of infant and maternal behaviour through a focus on attachment-relevant behaviour and the disciplined use of their social-cognitive judgements.

These lessons have shaped our current, relatively standardized, home observation procedure. A home visit typically begins with one visitor chatting with the mother about the study and obtaining informed consent and demographic information while the second visitor has an opportunity to take notes on the mother and baby's behaviour in the earliest stage of the visit. When the baby appears to have accommodated to the presence of the visitors, the mother, baby, and visitors move to the kitchen table where one visitor conducts an informal version of a developmental assessment (Bayley, 1995) and the second observer helps the mother get started with the Attachment Q-sort (Waters, 1995). After this phase, there is a period of play and the visit concludes with one visitor interviewing the mother and the other visitor takes notes. Although the mother is occupied with tasks throughout the visit, the visits have an informal tone in which the mother is given opportunities to attend to her infant's signals. The visitors are careful not to interfere with maternal behaviour directed to her baby. Our goal is to create a visit that simulates the busy world of parents and their children in which the tasks of relating are blended with ongoing life events. Notice also that the visits are designed to allow time for each visitor to take notes about infant signals and maternal attention and responses to these signals.

These notes are the basis of a post-visit debriefing interview, with a person who is well versed in

attachment principles but blind to any identifying characteristics of the dyad other than the infant's age and sex. The interview provides a reconstruction of the basics of the visit with particular focus on attachment relevant events concerning the infant's fusses, secure base behaviour, signals to mother, occasions for proximity seeking and the mother's monitoring of her infant, responses to signals, and her physical as well as psychological availability. We began these interviews with the idea that we could develop a vocabulary for describing interactions that would serve as the basis of a revision of the Maternal Behaviour Q-set. We discovered that the debriefing interviews serve several important functions in their own right. For less experienced observers, the interview serves to orient the observer's attention and note taking to crucial events. For example, the novice observer might well miss the initial reaction of both the mother and the infant to the visitor's entry. Because we have a Bayley case and video equipment, our entry is seldom subtle. Visitors often are busy with introductions and trying to figure out where to hang their coats and may forget to notice how the infant reacts to the strangers invading his or her home, what signals are given to the mother, if and how the mother introduces the infant, and how she manages the transition to wherever the initial interview is conducted. The debriefing interview provides an opportunity for the visitor to elaborate on her notes. After a summary of the visit, the interviewer feeds back impressions of the infant's attachment strategies and these impressions are either validated or corrected by the visitor. Similarly the interviewer offers his or her appraisal of the mother's availability, monitoring, cooperation, and acceptance as well as her caregiving strategies. In the final section of the interview the relationship is summarized and classified according to criteria we articulated based upon an organizational view of attachment relationships (Pederson & Moran, 1995a).

The debriefing interview provides the visitor with a review of the attachment relevant behaviour that assists her in completing the Maternal Behaviour and the Attachment Q-sorts. We believe that the interview and extensive note taking are essential features of successful home observations. One indication of the impact of the debriefing procedures is an improvement in the quality of the q-sort sensitivity data. Recall in our first study, inter-observer reliability was .75. In the two studies conducted since the introduction of the debriefing procedures, inter-observer agreement substantially improved to $r = .94$ and $.95$ for the 8- and 12-month observations in the Pederson and Moran (1995) report and $r = .91$ in the Pederson, Gleason, Moran, and Bento (1998) study. There was also a substantial increase in the correlation between sensitivity scores and the security score from the mothers' Attachment Q-sorts from $r = .29$ (Pederson et al., 1990) to $.49$ (Pederson & Moran, 1995a). Observer-based sensitivity assessments show good stability over time, a correlation of $.71$ between observations of the same dyads at 8 and 12 months of age (Pederson & Moran, 1995a).

Further evidence of the validity of our procedures is that in the two studies conducted since

instituting these standardized home observation protocols, sensitivity scores were clearly related to attachment security as independently assessed in the Ainsworth, et al (1978) Strange Situation. In the Pederson and Moran (1996) study, home observations were conducted at 8 and 12 months of age and the Strange Situation was conducted at 18 months. The effect size between the sensitivity scores between secure and non-secure dyads in the strange situation was over 0.75 SD from the 8 month observations and over 1.5 SD from the 12 month observations. An even larger effect size of 2.0 SD was found in the Pederson, et al (1998) study in which the home observations and strange situations were conducted at 12 months.

Future directions in the study of parental sensitivity.

The research described in this paper has involved the version of the Maternal Behavior Q-set that we wrote almost a decade ago. We are currently working on version 3. In our revisions, we are attempting to address some conceptual and empirical problems that we have discovered from our application of version 2. There are some items that are characteristic of sensitive parents but do not directly reflect the infant's experience. For example, "Knows a lot about her B; is a good informant" was constructed from Ainsworth's (1963) first observational study of attachment in Uganda. She noted that mothers who were in what she considered to be secure relationships with their infants were excellent informants. They knew their infants well and their descriptions matched Ainsworth's own observations. Ainsworth's conclusions are consistent with our experience of the perceptiveness of mothers in secure relationships. Furthermore, in most cases, it is possible to get evidence relevant to this item even in a short home visit and observers generally agreed about the scoring of this item. The difficulty is that the item refers to the observer's rather than the infant's direct experience with the mother. Because our goal in writing q-set items is to describe mother-infant interactions rather than identifying sensitive mothers, items that did not directly describe the infant's experiences were omitted. A second motive for embarking on a revision is our desire to develop descriptions of maternal behaviour that would distinguish avoidant from ambivalent relationships. Examples of new items for the identification of maternal behaviour we think is relevant for describing ambivalent relationships include: "Terminates physical contact before B is satisfied" and "Interactions with B are characterised by conflict." New items describing what we call teaching mothers in avoidant relationships include "Interactions object oriented (e.g., with toys, food)" and items for mothers in avoidant relationships who ignore their infants such as "physically aloof when interacting with B."

In addition to these revisions, we are also working on alternative uses of the q-sort procedures. As implied by the examples of new items, we hope to develop domains of maternal behaviour that are associated with different forms of attachment relationships. Our students are working on cluster analyses

in order to identify mothers with similar patterns of q-set items (Neufeld, Waters, Pederson & Moran, in press). John Kirkland at Massey University is interested in applying his hierarchical cluster analysis procedures to our q-set with the goal of describing the domains of maternal behaviour.

A Conundrum

One of the major purposes of the Pederson, et al., (1998) study was to provide a rigorous test of the hypothesis that parental sensitivity would mediate the relations between autonomy in the Adult Attachment Interview and security in the Strange Situation. Recall that in van IJzendoorn's (1995) meta analysis he concluded that sensitivity appears to play only a relatively minor role in accounting for the relations between parental attachment cognitions and attachment security. We were confident that having solved the procedural problems of assessing sensitivity, we would be able to demonstrate that autonomous mothers were more sensitive and their sensitivity was responsible for their infants secure attachment. Much to our surprise, we were wrong. Although sensitivity was robustly correlated with attachment security ($r = .51$), it was only weakly related to AAI autonomy ($r = .28$). A path analysis testing the mediational model indicated that maternal sensitivity accounted for only 17% of the relation between AAI and Strange Situation classifications, an effect even weaker than the van IJzendoorn (1995) estimate (see Figure 2). If, instead of focusing on the mother, we take the Attachment Q-sort measure of infant security as an alternative measure of dyadic interactive behaviour, the results are remarkably similar (see Figure 3). As can be seen in Figure 3, the infant's security as assessed in interaction was weakly related to maternal autonomy even though it was significantly associated with secure relationships assessed in the Strange Situation.

Taken together, the results of our several studies using the Maternal Behaviour Q-set pose an empirical conundrum that, in turn, raises an interesting conceptual challenge. On the one hand, the results suggest that this measure, used in conjunction with the observational methods we describe here, provides a meaningful assay of maternal behaviour in interaction with her infant — it is significantly and substantially related to well-established measures of the attachment relationship and results of studies using the assessment provide conceptually coherent portraits of the interactions between mothers and their infants. Despite the empirically established validity of the assessment, our studies have failed to establish that maternal sensitivity adequately accounts for the robust association between the attachment relationship and maternal representations of attachment. Moreover, although both were found to be strongly related to the attachment relationship, maternal representations and sensitivity were surprisingly weakly related to one another. It is difficult to resolve this finding within a developmental model that proposes mother-infant interaction as the primary route of trans-generational transmission of attachment representations from parent and to child via their initial relationship.

This conclusion is not to suggest that further refinements of our methods of describing mother-infant interaction are not worthwhile, nor that it would not be fruitful to pursue assessments that elaborate on the traditional sensitivity-responsiveness focus that has characterised most methods; an exploration of descriptions that reflect underlying maternal representations of intimate relationships might be particularly valuable. However, even if we assume that such refinements will provide us with increasingly meaningful measures of the variability in early mother-infant interaction, the pattern of empirical results to date suggests that the traditional conceptual model will continue to be an incomplete fit; that is, improved assessments may give us stronger results but it seems unlikely that they will alter the basic patterning of associations between adult representations, interactions, and quality of the attachment relationship.

The most obvious alternative to a model that portrays mother-infant interaction as the primary mediator between a mother's representations of attachment and the relationship with her infant would be that which attributes the marked association of adult cognitions with parent-child relationship to the substantial overlap in the genotypes of mother and infant. Given the growing evidence of genetic correlates of parenting behaviour (Braungart, Plomin, & Faulkner, 1992; Plomin, Reiss, Hetherington, & Howe, 1994), such an account appears credible. A genetic model would predict that infant characteristic known to have a strong genetic basis and to be resistant to experiential modification would be systematically associated with variations in attachment. Temperament is one such characteristic. Despite findings that establish temperamental influences on infant-mother interactions, especially relating to distress and resistance (Calkins & Fox, 1992; Fox, 1995; Goldsmith & Alansky, 1987; Kagan, 1989; Kagan, Arcus, & Snidman, 1993; Mangelsdorf et al., 1990; Moran & Pederson, 1998; Vaughn, et al., 1992), empirical attempts to establish a consistent association between infant temperament and patterns of attachment have failed (Mangelsdorf, et al., 1990; Seifer, et al., 1996; Sroufe, 1985). Even if such attempts were to prove fruitful in the future, any model that emphasises genetic factors must also invoke substantial involvement of mother-infant interaction. That is, excepting the most simplistic model of genotype-phenotype causal mechanisms, any such theory must invoke some degree of mother-infant interactional mediation of genetic influences --- leading back to a version of the traditional model.

The Traditional Model

The traditional theoretical account of the developmental transmission of behavioural-cognitive patterns of attachment is illustrated in Figure 1. As has already been discussed, the model was recently examined in a series of meta-analyses by van IJzendoorn (1995) and tested within a single sample by our research group (Pederson et al., 1998). This model stems directly from a basic premise of Bowlby's (1969) original articulation of attachment theory that maternal behaviour in interaction is the predominant

determinant of the mother's developing relationship with her infant and that her interactive behaviour is substantially determined by her own representations of intimate relationships. The model underlies much of the research and thinking about attachment but has received relatively little formal description or critique. As a result, it has been reduced to a level of simplicity that does not do full justice to the rich conceptualization of attachment that it must represent. A few illustrative examples provide persuasive support for this assertion. No attachment theorist would deny that a mother's interaction with her infant is influenced by her own representation of intimate relationships but also that such interaction has the potential to modify and reinforce these same representations; that is, the developmental relation between the elements of the model are bi-directional. Yet, the need to mould the model to standard statistical analyses sees these relations most often implicitly treated as unidirectional causal links. The mediational model tested by van IJzendoorn (1995) and by Pederson et al. (1998) explicitly portrays the mother's sensitivity as stemming from her representations of attachment and in turn shaping the relationship. The smaller arrow ends in Figure 1 are meant to suggest the extent to which developmental processes in the opposite directions are downplayed or ignored. In the traditional model, sensitivity itself is also treated as if it was a feature of the mother alone, in spite of the fact that, conceptually, this variable is must be seen as a property of the mother-infant dyad (Moran, Pederson, & Tarabulsy, 1996). The infant provides the immediate context for the mother's interactive behaviour; for example, an infant who makes few bids for attention provides little basis for responsiveness on the part of the mother. Over a longer time span, a mother's interactive patterns are more or less a product of her history of interaction with her infant from birth rather than a characteristic stemming from her experience independently of her child.

Given the empirical gridlock and conceptual issues associated with the traditional model, there may be some utility to building an alternative that more accurately reflects the full conceptual complexity of attachment theory.

A Reconceptualization

A new model must incorporate the following observations, all of which have long been explicitly or implicitly associated with attachment theory:

1. *The attachment relationship is dyadic, fundamentally and irreducibly a joint construction of the parent and the infant.*

Relationships are dyadic in nature, and not reducible to characteristics of either the mother or the infant. Accordingly, the Strange Situation provides a categorization of the attachment relationship itself and is not intended as a description of only one of the interactants. Thus, infants are described properly as being in secure or non-secure relationships rather than as

secure or insecure infants. Labelling an infant as secure or insecure is inconsistent with the fact that an infant may form a secure relationship with one parent and a non-secure relationship with the other (see Fox, Kimmerly, and Schafer, 1991).

2. *Although descriptions typically focus on the infant or the parent, assessments of interactions intrinsically reflect the behaviour of both interactants.*

The Water's Attachment Q-set focuses the observer's attention on the infant's interactive behaviour. This behaviour is also a function of the mother. A mother in a secure relationship will be more likely to be appraised as sensitive with an infant who is not fussy, engages in physical contact, and clear secure base behaviour than will a mother in a non-secure relationship. The behaviour of each interactant supports certain behaviour in their partner and not other behaviour; at the same time, the interactive behaviour of each is, in itself, a function of their past interactions and their relationship.

3. *Interaction is conceptually distinct from relationship, the former is essentially behavioural, the latter a hypothetical construct.*

The concept of levels of analysis within social organization has long been a feature of the theoretical writings of Hinde (1987). Interaction between two individuals is a fleeting and unique event in time and space. Any description of such behaviour of necessity requires some degree of inference. These descriptions, however, continue to be tied closely to the behaviour in interaction, typically involving a generalization about a set of observations, e.g. the degree of sensitivity of the mother, the degree of secure base behaviour of the infant. Although the Strange Situation categories derive from the observation of semi-structured interaction between mother and infant, they are not equivalent to those interactions; rather, they are intended to represent the relationship that lies behind the pattern of interaction. In contrast to those interactions, the relationship categories are assumed to be more stable and relatively constant constructions of the mother and infant. The relationship descriptive system relies on a series of structured inferences made by trained observers who ultimately categorize the relationship between the two participants.

Unlike interactions that involve actual movement in space and time that can be segregated into the actions of individuals, the relationship is a hypothetical construct that is inextricably dyadic in nature. Hinde (1987) argued that the value of this construct lies in its usefulness as a summary variable of the interaction history of two individuals. We use the construct of relationship to account for the fact that this history of interaction has a profound impact on the structure and course of interactions beyond the effect of the specific actions of the

interactants themselves.

4. *The causal relations among parental attachment representations, parent-infant interaction, and the attachment relationship are reciprocal, comprising a system rather than a unidirectional causal chain.*

A mother's cognitions regarding intimate relationships have an impact on her interactions with her infant; in fact, prenatal Adult Attachment Interviews are predictive of the quality of the mother-infant relationship at a year of age (e.g., Benoit & Parker, 1994; Fonagy, Steele, & Steele, 1991). Any theory of attachment, however, must allow for a reciprocal impact. Interactions with her own infant, more or less, will alter the mother's ways of thinking about the attachment relationship and, more generally, intimate relationships. The attachment relationship is both a determinant of interaction of the social partners and modified by those interactions. Such reciprocal relations are notoriously difficult to capture with extant statistical techniques and often resistant to easy description or even discussion; our language and perhaps our way of conceptualizing the world, lend themselves more readily to simpler causal models.

5. *A relationship can be modified by alterations in its representation by one of the social partners, without interaction.*

This assertion cannot be traced explicitly to traditional attachment theory but flows from its assumptions. Put simply and by example, a mother's own representation of her relationship with her infant is most definitely not the same as the relationship. That is, individuals (it is easier to conceptualize this notion for two adults but the principle applies to parents and infants as well) involved in a single relationship very commonly have different representations of that relationship; we would expect that the more similar these representations, the more coherent the relationship, but it is difficult to imagine even the most coherent relationship giving rise to identical representations. In this sense, we extend the use of the hypothetical construct, relationship, beyond that of a surrogate for a history of interaction (as suggested by Hinde, 1987). The relationship also may also denote the unique combination of the separate representations of the relationship by each member of the dyad --- the exclusive property of neither partner. From this, and again by illustration, it seems unavoidable that, although most obviously altered by interaction, the relationship can be changed by a change in its representation in the mind of one social partner, without interaction. That is, a mother's state of mind regarding her relationship with her child might be altered by a range events that do not involve direct interaction with the infant; for example, discussion with another mother, a major change in the marital relationship, the death of a loved one, or information about a serious medical condition of her child. Such

changes have the power to change her relationship with her infant without interaction and the changed relationship will have an impact on her next interaction with the child.

6. *A complete model of attachment requires both structural elements and a mental process by which those elements develop and evolve.*

To this point, the arguments presented in this paper have stressed that attachment theory, as originally conceptualized by Bowlby and Ainsworth, included the assertion that the infant's internal working model of attachment emerges largely as a function of the quality of sensitivity displayed by the mother interaction with her child. In future developments of attachment theory a clearer conceptualization of the processes that mediate the relationship between the infant's interactional experiences and the development of his or her internal working model is needed.

These six observations are not meant to suggest a new attachment theory or theory of early social relationship; quite to the contrary, they are consistent with the original formulation of the theory and, more to the point, reflect a set of assumptions that are widely shared by those studying attachment. For example, Sroufe and Fleeson (1988), laid out a set of four propositions that overlap to some degree with those set out here.

A Reconceptualization of the Developmental Model

Figures 4, 5, and 6 illustrate a model of the inter-relations between maternal representations, the mother-infant relationship, and mother-infant interaction that incorporates the propositions described in the preceding section. Figure 4 provides an overview, involving three distinct conceptual levels: individual representation, relationship, and interaction. At the level of individual representation, it is proposed that a mother has a broad representation or state of mind regarding intimate relationships. Different categories of intimate relationships, including mother-infant relationships, are represented independently but are all related to this more general level of representation. Note that cognitions regarding each specific category both are influenced by and affect the broader conceptualization of all intimate relationships. Within this model, the Adult Attachment Interview is portrayed as providing a characterisation of a mother's representation of the nature of the generic parent-child attachment relationships. The mother's mental representation at this generic level has an indirect influence on her relationship with her infant. Still at the level of maternal representation, the model suggests that the next level of specificity provides for a mother to form a distinct representation of her relationship with each of her children. For each, the representation will be a function of both the mother's generic conceptualization of this category of relationship and of the experience of the particular relationship, suggesting both a degree of similarity and distinctiveness between a mother's representations of her relationships with each of her children.

Returning to Figure 4, the next element of the model involves a shift from factors existing within a mother's personal mentalization to the level of the relationship. This level of the model makes explicit the fact that the a relationship is conceptually distinct from the interactions between two individuals and is a joint feature of the mother-infant dyad. In Figure 4, the box enclosing the mother's representation of mother-infant relationships and the particular mother-infant relationship itself signifies the fact that, because of the sharp discrepancy in sophistication between the mental representations of mother and infant, the association between relationship and the mother's conceptualization of the class of relationships is likely initially to be very strong. As the relationship develops and the child's mental sophistication increases, the influence on the relationship on the mother's conceptualizations of it increases (to be discussed with reference to Figure 5). The mother-infant relationship is at once an important determinant of interactions between the mother and infant, and is importantly shaped and modified by those interactions. As already suggested, the level of interaction is distinct conceptually from the representational levels of the actors.

Figure 5 focuses in on the details of the place of the particular mother-infant relationship in the model and underscores the point that the overall developmental process is dyadic, involving mutual influence through interaction and relationship. The figure also makes it clear that a parallel to Figure 4 could be constructed in which the focus would be the relation of the child and his/her less sophisticated but evolving representations of attachment to the broader developmental process involving the mother and her representations. Note that, although each member of the dyad forms a representation of their relationship, the relationship is a hypothetical construct at a conceptual level different from those representations — the representation of the relationship is not the relationship (Aitken & Trevarthen, 1997, for a related discussion). Within the model any number of inter-relations between the factors are possible. That is, members of a dyad may have similar or distinct representations of their relationship. Each representations may more or less accurately reflect the relationship. The other key association illustrated in Figure 5 is that between the relationship and interaction. As Ainsworth has consistently asserted, attachment behaviour interactions between the mother and infant is related to but not synonymous with their relationship.

Another perspective on the model is presented in Figure 6. The first key element of this illustration is the assertion that a single mother's representation of mother-infant relationships will be causally associated with each of her more-or-less distinct relationships with each of her children. In addition, the figure allows for the existence of influences on the mother-infant interaction other than those at the levels of individual; these include non-dyadic factors such as social support and the impact of the status of other relationships. Thus, for example, interactions between a mother and her infant are

undoubtedly influenced by the state of her relationship with her spouse. Finally, the illustration situates some of the traditional measures of mother-infant interaction within the overall model, emphasizing that measures such as infant attachment, maternal sensitivity, and the mother's behaviour associated with affective and cognitive scaffolding reflect aspects of the interaction rather than each individual, even where the focus of the description is on one of the interactants.

The overall organization of the model presented in Figure 4, 5, and 6 differs sharply from the traditional model illustrated in Figure 1. As already argued, the traditional model portrays the developmental process largely as unidirectional with maternal representations giving rise to qualities of maternal sensitivity in interaction which in turn determine the nature of the mother-infant relationship. This reconceptualization of the developmental process changes the relational patterning of these elements and stresses explicitly the reciprocal associations that shape all elements within each individual and their joint relationship. Individual representations of relationships exist in a hierarchical structure. Each individual's representations of a particular relationship influences and is influenced by the relationship itself. This association is portrayed as direct rather than mediated by interaction because a relationship can indeed change as a function of a change in the representation of that relationship for one of the individuals, in the absence of interaction. Thus, for example, a mother may have an important conversation with another adult that will change substantially her sense of her relationship with her child. Without any intervening interaction, their relationship will change. This change will only be manifest through interaction but it does not require interaction to be effective. Returning to the developmental model, the relationship influences interaction and is influenced by interaction between members of the dyad. In this fashion, the relationship acts as a mediator allowing for interaction to have an impact on representations of the relationship and higher order related representations, for both members of the dyad.

Application of the Model: Illustrative Examples

The primary function of the model presented here is to act as a heuristic in our understanding of the processes related to the development of relationships and of cognitive representations of relationships. A number of illustrations of the application of the model to observations from the research literature may provide a better sense of its nature and utility.

Studies of attachment in infancy have established clearly that the quality of the attachment style of an infant with one parent may be different from that with the other parent. A review of research in this area by Fox, Kimmerly, and Schafer (1991) is consistent with the suggestion that the infant's emerging internal working models, reflected by the distinct relationships, both share some features and are also distinctive, presumably a result of a history of differential patterns of interactions with the two parents. It would not be surprising that adults' representations of different relationships would show the same level

of differentiation. In fact, work by Bartholomew and Horowitz (1991) provides evidence for this sort of differentiation at the higher level of representation suggested in Figure 4. In a study using semi-structured interviews of adults who were asked to describe their relationships with family and friends, they found commonalities between representations of the two categories of relationships but also a significant degree of independence. Collins and Reed (1994) have proposed a model of adult representation of relationships that includes this same concept of a hierarchical structure, moving from the most general through different categories of relationships to representations of particular relationships.

In addition to making explicit the concept of a hierarchy of levels of representation within each member of a relationship, the model makes explicit the distinct conceptual level of the relationship. This concept may seem something of an obscure abstraction when interpreting infant-mother behaviours in the Strange Situation, but the following three illustrations from research on adult relationships may make the concept more concrete. The first illustration comes from Kobak and Hazan's (1991) study of marital relationships. In this study, 40 couples completed two q-sorts describing their spousal relationship. The first sort described their own behaviour and the second their spouses' behaviour. These q-sort descriptions correspond to the conceptualization of the relationship by each partner at the level of individual representation in Figures 4 through 6. A measure of agreement of each spouse's conceptualization of the relationship was obtained by correlating these q-sort descriptions (e.g., the correlation between the husbands' description of their own behaviour and the wives' description of their husbands' behaviour). The average agreement correlation was .55 with a substantial range from .02 to .77. In the model presented here, these far from perfect agreement scores would be seen as an indication of the fact that the relationship itself resides at the level of different from either interaction or that of individual representation --- that is a dyadic construct accessible in whole to neither partner in isolation. The agreement scores varied across couples, reflecting the variation in the degree to which the husband and wife shared a common representation of the relationship; a higher level of agreement, in this sense, indicating a more coherent or intimate relationship. Consistent with this portrayal, the agreement scores were systematically related to other measures of the quality of the relationship. The coherence of their representations was positively related to each spouse's satisfaction with the quality of the relationship as measured by the Dyadic Adjustment Scale and was inversely related to both the wives' and husbands' dysfunctional expressions of negative emotions while discussing a topic of disagreement in their marriage. Thus the coherency their representations of their relationship in married couples is related to interactive behaviour just as it is for the mother-infant relationship and their interactions.

Kobak and Hazan (1991) did not have more direct measures of mental representations at the individual level; however, Judith Crowell and her colleagues have developed the Current Relationship

Interview (CRI) (e.g., Owens, Crowell, Pan, Treboux, O'Conner & Waters, 1995) to provide just such a measure. The CRI is modelled after the Adult Attachment Interview (AAI) except the questions are about the person's current romantic relationship. The rating scales and classification procedures with the CRI also parallel the procedures for the AAI. Owens, et al, (1995) interviewed 45 engaged couples with both the AAI and CRI approximately 3 months before their wedding. The individuals' representation of parent-child attachment relationships assessed on the AAI and of the current romantic relationship as assessed on the CRI were significantly, but modestly related. Ratings of Coherence of the interview, a key dimension for both assessment, were correlated .43. For the three groupings of autonomous, dismissing, and preoccupied, there was a 61% correspondence between the two interviews, significantly greater than the 41% agreement expected by chance. This pattern of associations is consistent with our model; that is, representations of parent child attachment relationships and of romantic relationships are both seen as associated with a single general representation of intimate relationships, thus some above-chance similarity would be expected. At a lower level of generalization, the two interviews are assessing representations of distinct categories of relationships and some divergence therefore would also be anticipated. Under the assumption that within couple agreement is a reflection of the concordance of their independent representations of their relationship and thus, at a joint level of representation, of the coherency of relationship, it is interesting to note that there was considerably higher levels of agreement on the couple's CRI classifications (78%) than on their AAI classifications (56%). This suggests that betrothed couples are more similar in the representations of their shared romantic relationship than of their respective attachment relationships.

Crowell, Gao, Treboux, Owens, and Waters (1997) reported on a follow-up assessment of these same subjects 18 months later (i.e., 15 months after the wedding). The wives' CRI classifications were relatively stable over the 18 month period, whereas the husbands' representation of the relationship did not show the same stability. Crowell, et al., interpreted this result as indicating that women's representations of adult attachment relationships develop earlier than those of men and that men's representations are therefore more subject to change as a result of adult experience, such as that associated with the early period of a marriage. These findings and the interpretation are entirely consistent with the model presented here. Interactions after marriage shape the relationship. If the wife's individual representation of adult attachment relationships is more well developed at marriage than the husband's, it is initially more likely to have the greater influence on the relationship at the joint level of representation and, in turn, on interaction (see Figure 4). The husband's less well formed and less stable conceptualisation of the relationship, then, will be susceptible to greater modification by interaction and the developing relationship itself.

The results of clinical interventions aimed altering the relationship between mothers and infants in high risk samples have posed something of a challenge of interpretation within the traditional developmental model. A number of recent studies using relatively brief, behaviourally-based techniques, aimed at modifying the interactions between a mother and her child have proven successful both at changing the interaction and the relationship as measured in the Strange Situation (Krupka, 1995, van den Boom, 1994). A review of published studies involving a variety of approaches (van IJzendoorn, Juffer & Duyvesteyn, 1995) found that the successful results of such behaviourally based interventions contrasted sharply with those of more psychodynamically oriented approaches aimed at altering the mothers mental processes related to her relationship with her infant. These results appear to be in conflict with the traditional developmental model. That is, because, a mother's sensitivity is seen as largely a function of her state of mind about attachment, one would expect that the model would predict that the most effective way to modify interaction and, thus, the relationship would be by way of intervention aimed directly at changing the mother's attachment representations. The reconceptualized model presented in this chapter, on the other hand, portrays interaction as being susceptible to direct modification and sees this modification as a direct route to the alteration of the relationship. Resultant modifications of the mother's representation of the relationship are likely to be more difficult and be manifest only after changes in interaction and the relationship itself; the processes reflected by the Adult Attachment Interview, because they lie at a more distant, more generalized level of the mother's representational hierarchy, are likely to be even more resistant to change.

As a final illustration of the application of the reconceptualized model, we turn to the results of our own study of the trans-generational transmission of attachment. Recall, that Pederson et al. (1998) found that, in contrast to the predictions of the traditional model, a mediated route via maternal sensitivity accounted for only approximately 18% of the direct association between maternal representations of attachment and the attachment relationship. The strongest empirical association in this study was found between maternal representations and the attachment relationship. Given that the mother's mentalizations about her relationship are an important determinant of that relationship, the reconceptualized model would predict just such a strong empirical association. So, too, the new model would predict the observed relatively strong association between measures of interaction (maternal sensitivity, infant security) and the quality of the relationship, immediately adjacent elements in the developmental system (see Figure 4). Finally, the weak, often elusive, association that has been found between maternal representations and maternal sensitivity flows naturally from the new model because these elements are relatively distantly separated within the model, mediated by the relationship itself, an element that is a function of representations of both the mother and the infant.

A Representational Process or Mechanism Underlying the Development of the Internal Working Model

The model presented in Figures 4 through 6 provides a new heuristic framework for the conceptualization of the interrelations between representational and experiential factors involved in the attachment process. The model does not contain, however, an account of how the various structures and events interrelates, a mental or representational process that accounts for the interrelations between the factors. Fonagy's (1994; Fonagy, Steele, & Steele, 1991; Fonagy, Steele, Steele, & Higgitt, 1991; Fonagy & Target, 1997) concept of reflective functioning provides such a representational process. Reflective Functioning refers to the ability and predilection of an individual to interpret and predict their own behaviour and that of others in terms of cognitive processes including knowledge, beliefs, and desires. It is possible to incorporate reflective self in to the alternative model as a process that determines the strength of the links among the elements of the model. For example, in Figure 4, for a mother who is more able to reflect accurately on an interaction with her infant, that interaction is more likely to reinforce or change that relationship; according to the same logic, changes in the relationship are more likely to affect her own representation of the relationship. The argument can easily be projected into the hierarchy of representations with in the mother: changes in the representations of particular categories of relationships are more likely to result in concordant changes in the representations of a more generalized level of relationships. In general terms, a higher level of reflective functioning will contribute to a system of representations and relationships that are likely to be affected by experience (either reinforced or modified) and to a more coherent system of representations, relationships, and interaction.

Next stages in our search for understanding representations, relationships and interactions

The model presented here is a heuristic intended to provide a basis for organizing and contemplating the various factors that are involved in the developmental processes that link adult representations regarding intimate relationships, the emerging relationship between mother and child, mother-infant interactions, and the developing representational structures of the infant. The model does not pretend to offer a new theory of attachment or early social-cognitive development. Rather, it is an attempt to make explicit the elaborations of attachment theory and many of the empirical findings that have accumulated in this active area of research in the period that has elapsed since the theory was originally articulated by Bowlby and Ainsworth.

This broader view of relationships may encourage an examination of other aspects of representational processes and their manifestations in interactions. For example, one of our students is applying Gottman, Katz, & Hooven's (1996) meta-emotion interview in order to examine the relations among parent's attachment representations, their representations of emotional states, and their socialisation of emotions. Another student is applying Lester Luborsky's model of transference to an understanding of the relations between representations of core conflictual relationships and representations of attachment relationship (Luborsky & Crits-Christoph, 1998). We are also examining the impact of a brief intervention program

on the sensitivity and quality of attachment relationships in adolescent mothers. We have no doubt that these investigations will provide us with many valuable learning experience to further our understanding of the complexities of early human relationships.

Figure Captions

Figure 1. An illustration of the traditional linear causal model linking maternal representations of attachment to her interactions with her infant and the developing attachment relationship.

Figure 2. A path diagram describing the results of a test of the model in which mother-infant interaction in interaction (reflected by maternal sensitivity assessed by the Maternal Behaviour Q-sort) mediates the impact of maternal attachment representations (from the Adult Attachment Interview) on the security of the attachment relationship (measured in the strange situation).

Figure 3. A path diagram describing the results of a test of the model in which mother-infant interaction (reflected by infant security assessed by the Attachment Q-sort) mediates the impact of maternal attachment representations (from the Adult Attachment Interview) on the security of the attachment relationship (measured in the strange situation).

Figure 4. A first illustration of a reconceptualization of the developmental system relating maternal attachment representations, the attachment relationship, and mother-infant interaction. This figure emphasizes that the mother's representation of intimate relationships can be conceptualized as including a variety of distinct but inter-related representations of different relationships.

Figure 5. A second illustration of the developmental system focusing on a particular mother-infant relationship and emphasizes the inter-relations between representation, relationship, and interaction.

Figure 6. A third illustration of the developmental system. The figure reflects the fact that a mother may have distinct relationships with her different children. The diagram also emphasizes the multiple approaches to measuring different aspects of interaction (such as the Maternal Behaviour Q-sort - MBQ - and the Attachment Q-set - AQS) and that those interactions may be affected by factors outside the relationship.

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Ideas

- Should add parallels for Fig 5&6 from Infant perspective....

Figures for MODELPAF

[modfig0406]

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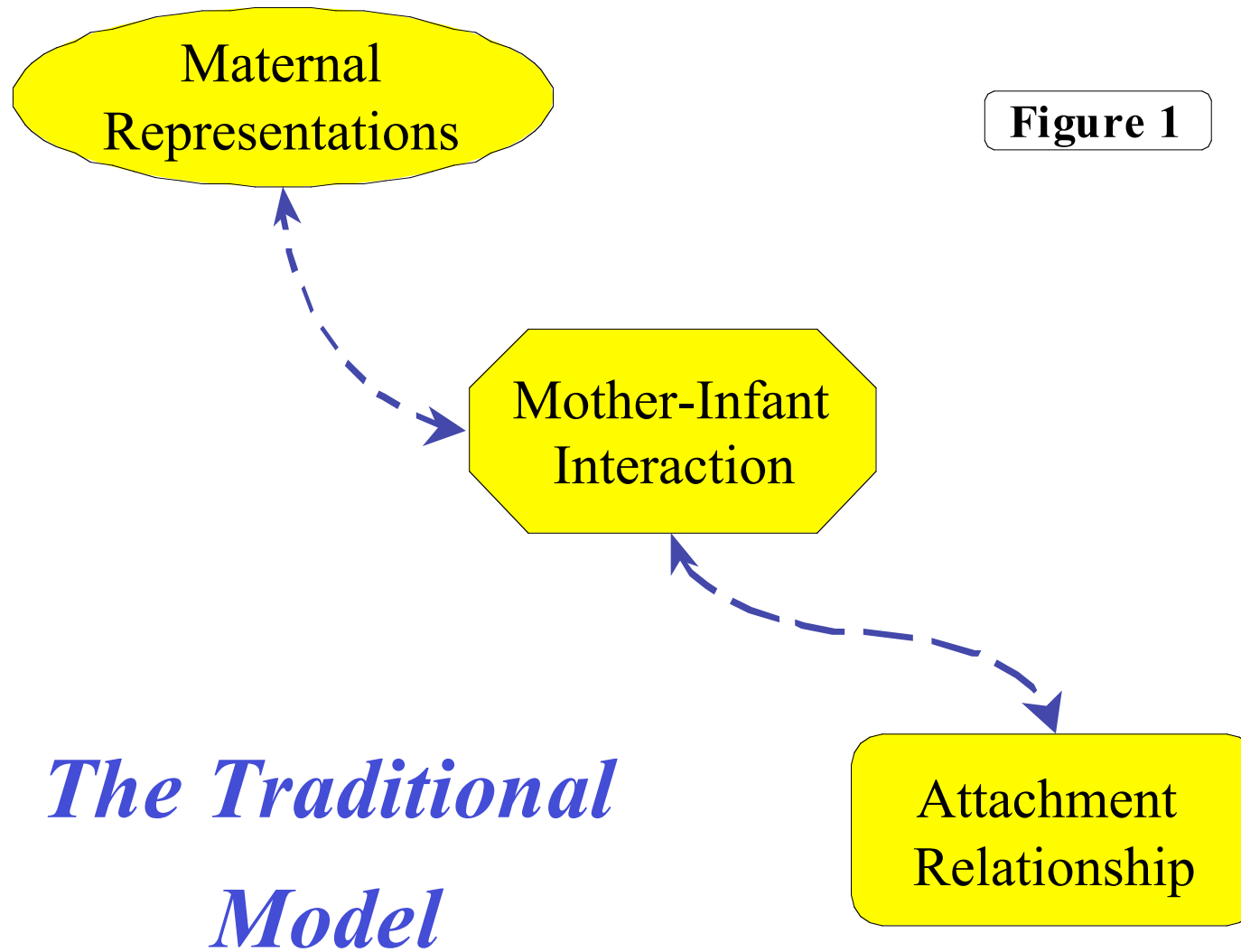


Figure 1

The Traditional Model

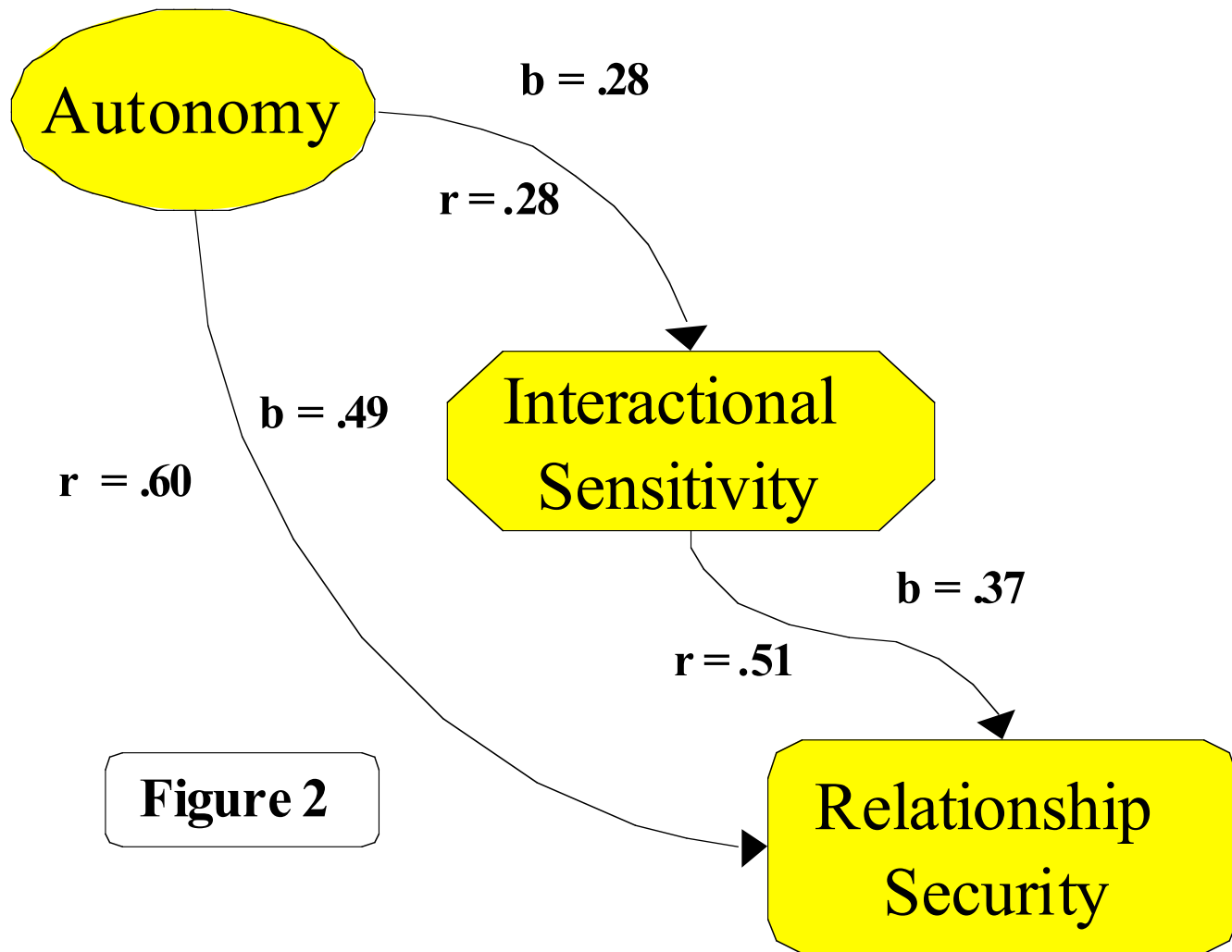


Figure 2

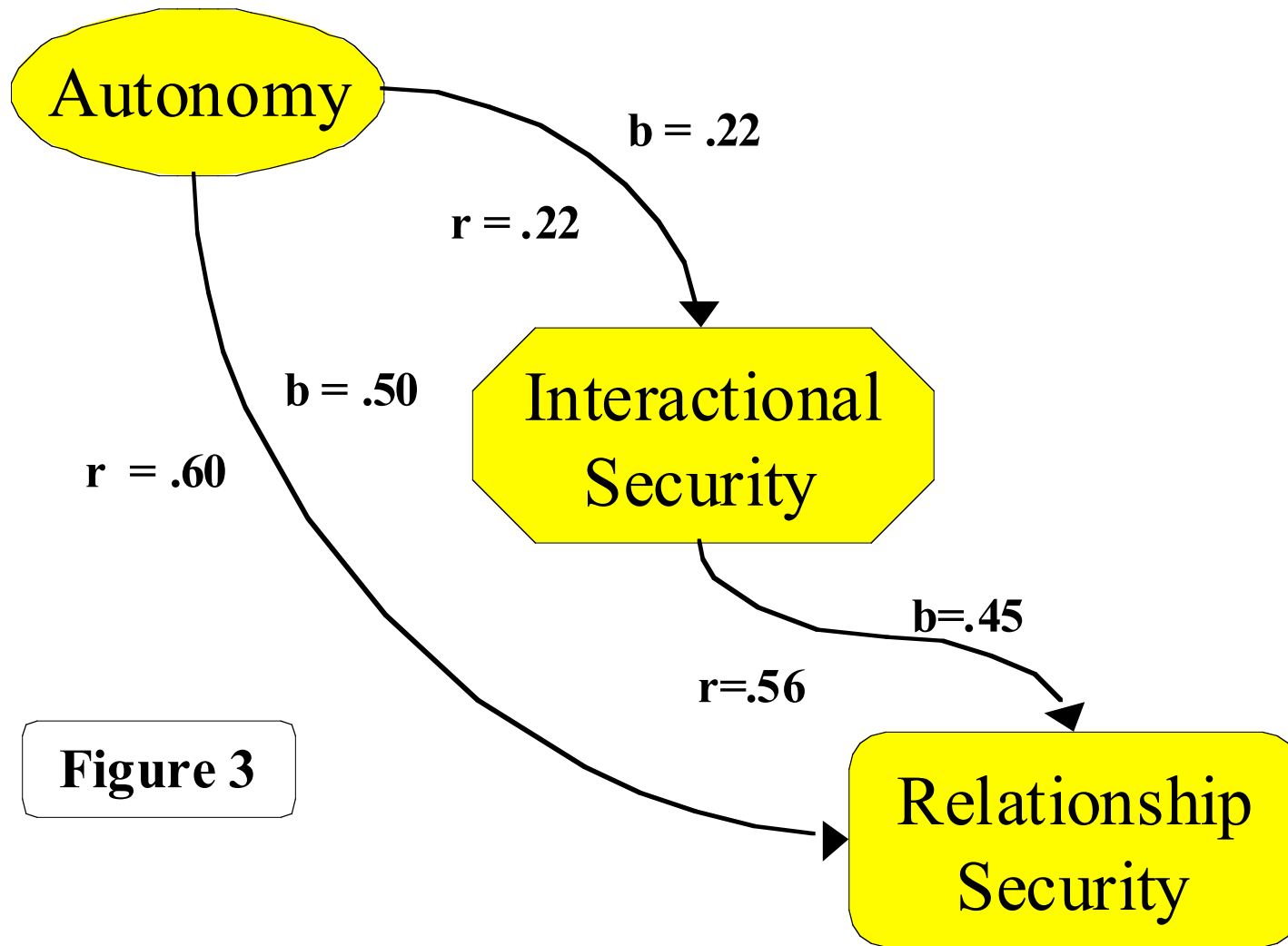
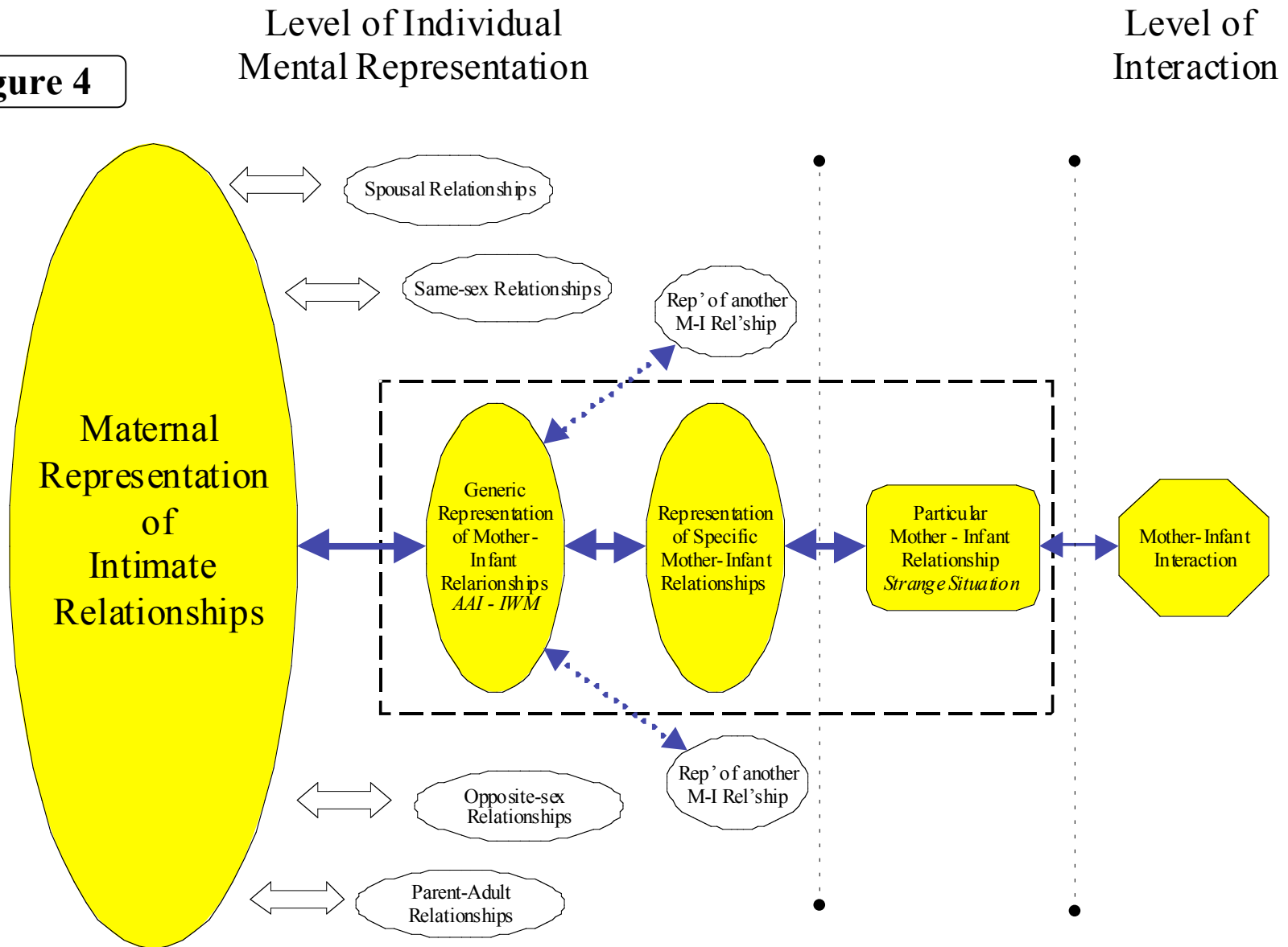


Figure 3

A Reconceptualization of the Developmental Path - View I

Figure 4



Maternal Representation

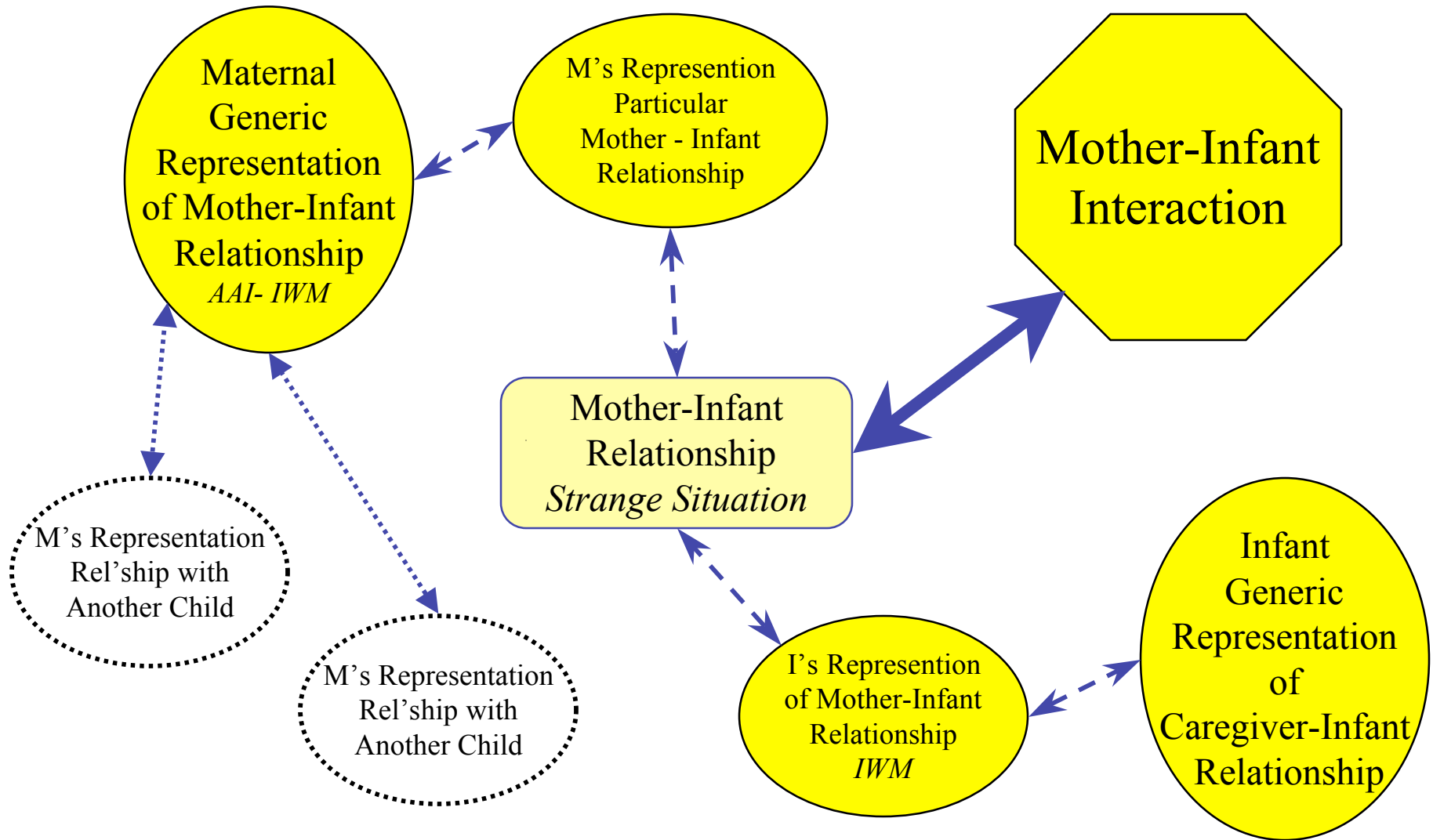


Figure 5

Infant Representation

Level of Representation

Figure 6

