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14

The Measurement of Attachment Security in Infancy and Childhood

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In this chapter we examine the methods of assessing attachment security in infancy and early childhood, at both the level of behavior and the level of representation. Our first goal is to provide the reader with an overview and summary of available measures, including new or lesser-known measures, along with information about their psychometric properties and the ways in which they have been used in research. Our second goal is to evaluate the current state of measurement in the field of attachment. How well do the available instruments and protocols actually reflect the construct of attachment security? How useful are these measures for testing core predictions in attachment theory?

This chapter can be used in several ways. Some readers, especially those new to research in this area, can use this chapter as a source of information to help select measures appropriate to their research. For readers who are familiar with childhood attachment assessment and well grounded in attachment theory, this may be their first opportunity to examine all of the measures together. This kind of overview is important for understanding the development of the field and providing a sense of new directions and opportunities for theory and research.

THE DOMAIN OF ATTACHMENT SECURITY

"Attachment security" is defined by Ainsworth, Blehar, Waters, and Wall (1978) as the state of being secure or untroubled about the availability of the attachment figure. As a construct, security can never be directly observed, but must be inferred from that which is observable. Furthermore, a construct is "evidenced in a variety of forms of behavior and not perfectly so in any one of them" (Nunnally, 1978, p. 84). How, then, do we determine whether a particular measure of attachment security is a "good" or valid measure of this construct?[1]

In practice, psychologists typically follow a three-step process. First, they operationalize the construct, either intuitively or with respect to theory or prior research. Second, they establish the basic reliability of the measure, asking themselves, "Can it be replicated over time [short-term stability of scores or categories], and, to the extent that the measure is tester-derived and thus requires some judgment, can scores, codes, and so forth, be agreed upon?" Finally, they evaluate how well the measure predicts (in the broadest sense) other theoretically important variables

(convergent validity) or is uncorrelated with theoretically unrelated variables (discriminant validity) (Campbell & Fiske, 1959).

Although this approach is well accepted, Nunnally (1978) has pointed out that it is based upon an inherent circularity in logic. We predict a relation between constructs, we "find" it using measures of the constructs at hand, and we thereby infer that our measures are valid. Optimally, construct validation requires three somewhat different steps (Cronbach & Meehl, 1955; Nunnally, 1978): (1) The domain of relevant indices or variables ("observables") must be specified, indicating which variables are indicative of security and which are not; (2) the intercorrelations among multiple concurrent measures of the construct must be ascertained; and (3) each measure must be cross-validated with respect to a network of other theoretically important constructs that have been similarly validated. Rather than being sequential, these three steps constitute a reflective process, in which knowledge gained from one step transforms our understanding of the others.

For attachment researchers, the domain of "observables," at least for infancy and toddlerhood (12 to 20 months), is currently drawn from Bowlby's (1969/1982, 1973, 1980) ethological attachment theory. "Attachment behaviors" are those that increase proximity to or maintain contact with a particular attachment figure. They are understood to be organized with respect to an internal system of control (the attachment system) that has the adaptive function of protection and the set goal of physical proximity or felt security (Sroufe, 1979). A critical feature of this model, with important implications for measurement, must be emphasized: The type of attachment behavior observed depends upon the degree to which the attachment system is activated. When a young child is alarmed, he or she can be expected to signal clearly for proximity to and contact with the attachment figure (crying, approaching, reaching, clinging). Once these are achieved, and in the absence of further disturbance, the child can be expected to accept some distance from the attachment figure and return to exploration. Attachment behavior under conditions of low activation, often referred to as "secure-base behavior," can be difficult to distinguish from friendly, affiliative behavior and can be very much influenced by features of the external environment (e.g., how far away the child can wander, how visible the mother is) (Carr, Dabbs, & Carr, 1975; Rheingold & Eckerman, 1970).

Ainsworth et al. (1978) have argued that this basic pattern (a shift from exploration to attachment behaviors and back) will appear disturbed or distorted to the extent that the infant perceives the attachment figure to be inaccessible or unresponsive. Thus, Ainsworth's classic measure of attachments in infancy (the strange situation), and the more recent Waters and Deane Attachment *Q*-Sort measure (AQS; Waters, 1987, 1995; Waters & Deane, 1985), which are described more fully later, focus on deviations from this basic pattern as a measure of insecurity in infant–parent attachment.

Attachment theory is less specific regarding appropriate measures of security in the third and fourth years of life and beyond. The attachment system is believed to function throughout this period, and indeed throughout the lifespan, but with diminishing sensitivity. Fewer situations are perceived as threatening, and knowledge of the parent's accessibility (rather than actual proximity or contact) is increasingly effective in terminating attachment behavior. In addition, the broader and more flexible behavioral repertoire of the older child, as well as the child's capacity to comprehend cognitively and therefore to anticipate and coordinate with the parent's behavior, can make it more difficult for scientific observers to perceive the underlying organization of attachment behavior. At the same time, the achievement of language and symbolic operations during this period begins to make it feasible to assess attachment security at the representational level.

CORE THEORETICAL PREDICTIONS

Whether one is following Nunnally's model of optimal construct validation or the commonly accepted but more approximate procedures of most investigators, the predictive (retrodictive, concurrent, predictive) validity of a measure is a fundamental concern. There are probably as many theoretically interesting relations among constructs in the field of attachment as there are researchers to propose them. Attachment theory as articulated by Bowlby and Ainsworth, however, provides certain key predictions regarding the relation between security and other variables that are core to the theory itself. The validity of any particular measure of security should be assessed at a minimum with respect to these. Acknowledging that there may be some dispute in the boundary areas, we propose the following core predictions:

1. *Attachment security should be positively related to the caregiver's accessibility and responsiveness to the child.* This prediction is implicit in the definition of security itself—that is, the state of being untroubled (confident) that the attachment figure will be available and will permit proximity and contact to the extent needed. An important corollary to this prediction is that attachment security with one caregiver should be independent of security with the other, insofar as the sensitivity of the two caregivers can be shown to differ. This follows from the definition of attachment security as a reflection of a particular relationship (Ainsworth et al., 1978; Hinde, 1982) and not (entirely) a property of the child (i.e., not a function of temperament or some other quality).

2. *Attachment security in a particular caregiver–child relationship should tend to remain stable over time.* Although Bowlby (1973, 1980) was well aware of destabilizing influences on infant–caregiver attachment (e.g., repeated separation, life stress) and avoided adherence to a doctrine of critical periods, he proposed that the quality of attachment should tend to remain increasingly stable and resistant to change as a function of mutual adaptation in interaction patterns and in each party's expectations about the other and the relationship. Sroufe and Waters (1977) emphasized the organizational quality of attachment; that is, although particular attachment behaviors may show little stability (due to the situation or the child's development), the underlying quality or organization of the relationship should be expected to remain stable.

3. *Attachment security should predict other important aspects of development.* Related to the notion of continuity, but distinct from it, is the general hypothesis argued by Bowlby (1973) and elaborated both theoretically and empirically by Sroufe (1979) that attachment security should predict other key aspects of development. Bowlby emphasized the effects of insecurity arising from separation and loss on the development of psychopathology. In contrast, Sroufe articulated the more normative construct of "coherence" in development; that is, successes or failures in one developmental task (such as attachment in infancy) should predispose the child (and the caregiver–child dyad) to success or failure in subsequent developmental tasks (e.g., autonomy, social competence). Sroufe's notion, though perhaps less central to attachment theory proper, parallels in many respects Erikson's (1950) classic formulation of developmental stages and has captured the attention of many researchers. It is important to note that it implies prediction to constructs other than attachment security, either concurrently or from one developmental period to another. In contrast, continuity implies prediction from an attachment security measure at one time to the same or a different measure of attachment security at another. Demonstration of *coherence* across time does not necessarily establish *continuity* in the attachment relationship.

4. *Attachment security can be assessed using similar or parallel measures cross-culturally and across attachment figures.* In the first two volumes of his *Attachment and Loss* trilogy, Bowlby (1969/1982, 1973, 1980) painstakingly built a case for the species-specific and therefore universal nature of attachment behavior in the young child. To the degree that a measure is based upon ethological attachment theory, it should function similarly across cultures; that is, it should be as effective in describing the range of attachment relationships found in one culture (society, ethnic group, social class) as it is in any other. In addition, it should be expected to be correlated in similar ways to measures of other theoretically important constructs, particularly to caregiver behavior. By virtue of the same reasoning, the effectiveness of security measures and the pattern of correlations to caregiver behavior should be similar for all attachment figures (e.g., mother, father, other caregivers).

ORGANIZATION OF THIS CHAPTER

For the period of infancy through early childhood (ages 12 to approximately 72 months), measures of attachment security are based on observation of behavior of one type or another. These measures can be further divided according to whether they focus on the organization of attachment behavior directed toward the caregiver or on the child's linguistic or play behavior (representational measures of attachment). Although the field of attachment has its theoretical origins in Bowlby's ethological theory of attachment, its empirical origins and the foundation of almost all subsequent efforts at assessment lie in the classification approach to attachment relationships pioneered by Ainsworth et al. (1978). This system of multidimensional categories of relationship, assessed on the basis of the infant's behavior in a laboratory separation and reunion context, has been both intuitively and theoretically compelling. The majority of measures for the

period beyond early toddlerhood have been designed deliberately to capture these same or similar qualitative differences in child–caregiver attachment at both the behavioral and representational levels. A second strand of development is represented by Waters's (1995) AQS method, which is designed to permit observers (either trained observers or caregivers) to describe infant or child attachment behavior in the home. We begin by describing Ainsworth's classification system and a recent modification of it (specifically, the inclusion of the disorganized/disoriented category). This is followed by a description and discussion of classification systems for reunion behavior and mental representation of preschool and kindergarten-age children, and then by information on the AQS approach. Each section includes a brief discussion of unresolved issues in the construct validation of the measure(s) in question. We conclude with a general discussion of measurement in the field.[2]

ATTACHMENT CLASSIFICATION IN INFANCY: THE STRANGE SITUATION

Attachment classification is based on the behavior of the young toddler (12 to 20 months of age) in the strange situation. This is a laboratory procedure that was designed to capture the balance of attachment and exploratory behavior under conditions of increasing though moderate stress (Ainsworth et al., 1978). Full directions for running the session and for classification are presented in Ainsworth et al. (1978). An outline of the episodes that make up the strange situation is shown in Table 14.1. Ainsworth's system provides instructions for classifying the infant's attachment relationship into one of three main groups: a "secure" group (B) and two "insecure" groups, "avoidant" (A) and "resistant" or "ambivalent" (C). Table 14.2 provides a brief description of classification criteria. Instructions are also available for designating eight subgroups, but the subgroups are rarely examined separately (due to limited sample sizes) and are not considered further here. Classification is based on the infant's behavior toward the caregiver during the two reunion episodes, viewed in the context of behavior in the preceding and intervening episodes and in response to the caregiver's current behavior. The infant's behavior during reunions can also be rated with respect to four scales of infant–caregiver interactive behavior that are used in the process of classification: proximity seeking, contact seeking, avoidance, and resistance to contact and interaction.

About 15% of attachments in normative samples and much higher percentages in high-risk samples are difficult to classify using the original A-B-C criteria (see Main & Solomon, 1986, 1990, for a complete discussion). Main and Solomon described the range of behaviors found in such unclassifiable infants, and developed guidelines for classification of most of these insecure infants into a fourth classification group termed "disorganized/disoriented" (D). Infants classified into Group D show a diverse set of behaviors that are characterized by a lack of observable goal, purpose, or explanation in the immediate situation, and, at a higher level of explanation, suggest that the child lacks a coherent attachment strategy with respect to the parent. (Further information about this category can be found in Lyons-Ruth & Jacobvitz, Chapter 23, this volume.)

Validation of the Measure

Beginning with Ainsworth's seminal work, validation of the infant classification system has been an ongoing priority. Many chapters in this volume summarize this progress, and the reader is referred to pertinent chapters throughout this section. In what follows, we briefly summarize the literature with respect to the construct validity criteria established earlier.

Reliability

Intercoder Agreement. The Ainsworth system and the other classification measures that we describe elsewhere in this chapter require extensive training. Some systems require certification or proof that the researcher can meet a minimum reliability standard. This is a departure from measures commonly used in psychology, and some further explanation may be helpful. Unlike event coding, which involves tallies of relevant, precisely defined acts, the classification process requires matching a particular case to a multidimensional, categorical template or prototype. Manuals for classification are composed mainly of written descriptions of these templates. These written descriptions cannot capture, however, the range and nuance of behavior and context that determine placement in a particular group. Only in training, where a student can see many cases

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TABLE 14.1. Episodes of the Strange Situation

Episode	Duration	Description
1	1 minute	*Parent, infant*: Dyad introduced to room.
2	3 minutes	*Parent, infant*: Infant settles in, explores. Parent assists only if necessary.
3	3 minutes	*Parent, infant, stranger*: Introduction of a stranger. Stranger plays with infant during final minute.
4	3 minutes	*Infant, stranger*: Parent leaves infant with stranger. *First separation.*
5	3 minutes	*Parent, infant*: Parent returns. Stranger leaves quietly. *First reunion.*
6	3 minutes	*Infant*: Parent leaves infant alone in room. *Second separation.*
7	3 minutes	*Infant, stranger*: Stranger enters room and stays with infant, interacting as necessary.
8	3 minutes	*Parent, infant*: Parent returns. Stranger leaves quietly. *Second reunion.*

of a particular type, can the student develop the expertise that will permit evaluation of new cases in terms of their fit to a particular attachment category.

Within-laboratory agreement for trained coders tends to be very high, ranging from 100% in the original Ainsworth and Bell study (Ainsworth et al., 1978) to 85–95% for researchers who were trained by Ainsworth or her students (e.g., Main & Weston, 1981; Waters, 1979). In the one published study that examined the important question of interlaboratory agreement on A-B-C classification, five expert coders and Ainsworth independently coded all or a subset of 37 cases (videotapes), several of which were chosen because of the classification difficulties

TABLE 14.2. Strange Situation Classification Groups

Group	Brief description
Secure (B) (Ainsworth et al., 1978)	Uses mother as secure base for exploration. Separation: Signs of missing parent, especially during the second separation. Reunion: Actively greets parent with smile, vocalization, or gesture. If upset, signals or seeks contact with parent. Once comforted, returns to exploration.
Avoidant (A) (Ainsworth et al., 1978)	Explores readily, little display of affect or secure-base behavior. Separation: Responds minimally, little visible distress when left alone. Reunion: Looks away from, actively avoids parent; often focuses on toys. If picked up, may stiffen, lean away. Seeks distance from parent, often interested instead in toys.
Ambivalent or resistant (C) (Ainsworth et al., 1978)	Visibly distressed upon entering room, often fretful or passive; fails to engage in exploration. Separation: Unsettled, distressed. Reunion: May alternate bids for contact with signs of angry rejection, tantrums; or may appear passive or too upset to signal, make contact. Fails to find comfort in parent.
Disorganized/disoriented (D) (Main & Solomon, 1990)	Behavior appears to lack observable goal, intention, or explanation—for example, contradictory sequences or simultaneous behavioral displays; incomplete, interrupted movement; stereotypies; freezing/stilling; direct indications of fear/apprehension of parent; confusion, disorientation. Most characteristic is lack of a coherent attachment strategy, despite the fact that the baby may reveal the underlying patterns of organized attachment (A, B, C).

Note. Descriptions in Groups A, B, and C are based on Ainsworth et al. (1978). Descriptions in Group D are based on Main and Solomon (1990).

that they presented (Carlson & Sroufe, 1993). Agreement percentages ranged from 50% to 100%, with the highest agreement (86%) found between Ainsworth and others. The fact that not all coders were trained to identify the disorganized/disoriented group may have influenced average reliability. The overall level of agreement is reassuring, especially considering the difficulty of the cases. The wide range of intercoder agreement, however, leaves room to question what level would have been achieved with a more diverse and less experienced group of coders. In studies that made use of coders trained to identify the disorganized/disoriented group, across- and within-laboratory agreement ranged from 80% to 88% (Carlson, in press; Carlson, Cicchetti, Barnett, & Braunwald, 1989; Lyons-Ruth, Repacholi, McLeod, & Silva, 1991).[3]

Short-Term Stability. Issues surrounding the short- and long-term stability of classifications are discussed thoroughly by Grossmann, Grossmann, and Zimmerman (Chapter 33, this volume). We note briefly here that classification stability is generally high (from 50% to 96%) when laboratory assessments are spaced 2 to 6 months apart or longer. The highest stability levels are generally found in middle-class samples, and the lowest in disadvantaged ones (Connell, 1976, cited in Waters, 1982; Lyons-Ruth et al., 1991; Main & Weston, 1981; Vondra, Hommerding, & Shaw, 1996; Waters, 1979; see Belsky, Campbell, Cohn, & Moore, 1996, and Thompson, Lamb, & Estes, 1981, for lower reliability estimates in middle-class samples). Stability of the D attachment classification over the course of the second year of life may be lower than that of the standard A-B-C classifications (Lyons-Ruth et al., 1991: 86%; Main & Weston, 1981: 50%; Vondra et al., 1996: 68%). Lyons-Ruth et al. and Vondra et al. reported an increase in numbers of disorganized/disoriented infants between 12 and 18 months. In a meta-analysis of nine samples (n = 840), however, in which the time-lag between assessments ranged from 2 to 60 months, van IJzendoorn, Schuengel, and Bakersman-Kranenberg (in press) estimate stability of the D classification to be strong (r = .34). Repeated assessments of the strange situation over the very short term (i.e., 2 to 4 weeks) result in much lower stability, presumably reflecting sensitization of infants to the separation procedure (Ainsworth et al., 1978). Thus, where research designs require repeated testing, researchers should avoid close spacing of assessments.

Relation to Other Measures of Security

One of the most compelling aspects of Ainsworth's original work was in the exceptional effort she and her colleagues made to validate the classification groups with respect to infant behavior toward the mother in the home. Home observation data for the original sample of 23 babies was based on detailed narrative records of monthly visits over the course of the first year of life. Drawing on this work, Ainsworth was able to develop a rich and complex portrait of each relationship. (See Weinfield, Sroufe, Egeland, & Carlson, Chapter 4, this volume.) Well-known findings from the study link classification in the strange situation to a set of variables reflecting the frequency and quality of infant attachment behavior in the home. Attachment classifications have also been assessed against home-based measures of attachment security—both a category system developed by Ainsworth and the AQS, which yields a summary security score reflecting the quality of an infant's secure-base behavior in the home. Broadly speaking, the results using all three approaches have been consistent: Secure versus insecure laboratory attachment classifications were related to different patterns of infant behavior in the home in ways predicted by theory. The two main insecure groups (A and C), however, were generally less well discriminated from each other in the home (Ainsworth et al., 1978; Vaughn & Waters, 1990). In addition, several studies using the AQS method have failed to find any relation between AQS security scores and attachment classification. (See the later section on the AQS.)

Prediction to Core Variables

Mother–Child Interaction. Ainsworth's original home observations established key differences among mothers of secure, avoidant, and ambivalent infants with respect to four highly intercorrelated variables: sensitivity (defined as prompt and appropriate responsiveness to the infant's signals), acceptance (vs. rejection), cooperation, and psychological accessibility. Mothers of secure infants were high on all four dimensions; mothers of avoidant infants provided the infants with little positive experience with physical proximity and were rejecting; and mothers of ambivalent infants were inconsistent or unresponsive to infant distress and other signals. These findings have been replicated in several studies in both naturalistic and structured situa-

tions, although the strength of the associations has been weaker in the replications. In a recent meta-analysis, DeWolff and van IJzendoorn (1997) concluded that parental sensitivity, although clearly important, does not appear to be the exclusive factor in the development of secure attachment. Given the centrality of the sensitivity construct in contemporary attachment theory, this is a radical notion. It should be noted that failure to replicate Ainsworth's original findings may reflect various kinds of measurement error—for example, reliance on more limited sampling of mother–child interaction (e.g., Pederson & Moran, 1995) and shifts in the operational definition of sensitivity away from Ainsworth's original emphasis on appraisal of signals and appropriate responding toward an emphasis on warmth, acceptance, and support (Seifer & Schiller, 1995).

The identification of the disorganized/disoriented category may be another influence on the strength of the association found between sensitivity and attachment security. Children classified into this group usually receive an alternate classification corresponding to the Ainsworth category they most nearly resemble. Perhaps the alternate classification corresponds to the general level of maternal sensitivity, whereas disorganization of the attachment strategy reflects other types of experience with the mother (Main & Hesse, 1990; Solomon & George, 1996, in press). In some cases, attachment disorganization may also arise from neurological vulnerabilities in the children (Spangler, Fremmer-Bombik, & Grossmann, 1996), although van IJzendoorn et al. (in press) found no association between temperament and D classification in their meta-analysis. There has been very little actual observation of patterns of mother–infant interaction related to the D classification. Reports from other investigators using Main and Solomon's criteria, however, strongly suggest a link between attachment disorganization and dysfunctional mother–infant interaction, including maltreatment (Carlson et al., 1989; Lyons-Ruth & Block, 1996; Lyons-Ruth et al., 1991; O'Connor, Sigman, & Brill, 1987; Schuengel, van IJzendoorn, & Bakersmans-Kranenburg, in press).

Individual studies have shown no relation between attachment security to mothers and to fathers (e.g., Belsky & Rovine, 1987; Main & Weston, 1981), supporting the basic premise that classifications reflect particular relationships and not, for example, an infant's temperament. However, meta-analysis has revealed a small but significant concordance in an infant's classification to both parents (Fox, Kimmerly, & Schafer, 1991; van IJzendoorn & De Wolff, 1997). This concordance may reflect the effect of negative emotionality (i.e., temperament) on the manifest expression of distress in the strange situation (Goldsmith & Alansky, 1987), as well as mutual influences and temperamental similarities between parents. The independence of attachment classifications to mothers and to other caregivers has also been found in several different contexts (see Howes, Chapter 29, this volume). Although a child's temperament may influence the development of regulatory strategies in the parent–child relationship and present a challenge to the parent's capacity to be sensitive, current evidence does not suggest that attachment classifications can be simply reduced to temperamental differences among children (Fogel & Thelen, 1987; Goldsmith & Harman, 1994; Seifer & Schiller, 1995). (See also Vaughn & Bost, Chapter 10, this volume.)

Continuity. Long-term stability or continuity of classification conducted between the ages of 12 to 18 months and 60 months has been reported to be very high (82%) in two studies that have made use of Main and Cassidy's classification system for kindergarten-age children (Main & Cassidy, 1988; Wartner, Grossmann, Fremmer-Bombik, & Suess, 1994) but considerably lower when attachment is assessed in preschoolers (Cassidy, Berlin, & Belsky, 1990). Substantial (72–77%) continuity of secure versus insecure classifications from the ages of 18 months to 20 years (attachment classifications derived from the Adult Attachment Interview [AAI]; George, Kaplan, & Main, 1984, 1985, 1996) has been reported (Hamilton, in press; Waters, Treboux, Crowell, Merrick, & Albersheim, in press). Stability has been found to be lower in other samples, however (Grossmann, Grossmann, & Zimmerman, Chapter 33, this volume; Thompson, Chapter 13, this volume). In the Waters et al. (1995) study, stability within the insecure group was lower than in the secure group, and changes in classification were linked to experiences of loss, abuse, or major illness over the course of development. Consistent with this view, Weinfield, Sroufe, and Egeland (in press) report little stability in secure versus insecure classifications in a high-risk poverty sample. Thus it appears that long-term continuity should not be expected in samples that have undergone major changes in

family functioning or status and/or when the family is under chronic stress.

Coherence. Beginning with Sroufe's (1979) early articulation of the coherence of development across developmental tasks, he and other researchers have established links between infant patterns of attachment and autonomy, peer relationships, social competence, and cognitive and socioemotional functioning (see Thompson, Chapter 13, this volume). In contrast to Bowlby's predictions, however, A-B-C classifications tend not to be strongly related to later measures of maladaptation—that is, to clinical indices (Carlson, 1998; Lyons-Ruth, 1996; Lyons-Ruth, Alpern, & Repacholi, 1993; Ogawa, Sroufe, Weinfield, Carlson, & Egeland, 1997). In a study of high-risk infants, the investigators reported that 71% of the sample in preschool and 83% of 7-year-olds who showed above-normal levels of hostility in the classroom had been classified as disorganized/disoriented in infancy (Lyons-Ruth, 1996; Lyons-Ruth et al., 1993). In addition, ratings of disorganization in the strange situation in infancy have been found to predict psychopathology in late adolescence (Carlson, 1998; Ogawa et al., 1997).

Cross-Cultural Predictions and Predictions to Other Caregivers. Studies of infants from cultures beyond North America in the strange situation have mainly been limited to Western Europe, but researchers have also examined infants and their mothers in Israel, Japan, and two sites in Africa (Kermoian & Leiderman, 1986; Miyake, Chen, & Campos, 1985; Sagi et al., 1985; Takahashi, 1986; True, 1994; see van IJzendoorn & Sagi, Chapter 31, this volume). Although secure classifications appear to be normative cross-culturally (Sagi, 1990), cultural differences have emerged in the proportions of attachment types, and debate continues regarding the cross-cultural interpretation of strange situation classifications (e.g., Levine & Miller, 1990). Corresponding observations of maternal behavior in the home (e.g., Grossmann, Grossmann, Spangler, Suess, & Unger, 1985) suggest that differences in the distributions of classifications may reflect systematic cultural differences in maternal behavior. They may also reflect differences in the frequency with which infants in different cultures and subcultures experience even brief separations from their mothers (Jackson, 1993; Miyake et al., 1985; Takahashi, 1986).

Investigators have reported no difficulty in classifying infant–father attachment relationships from the strange situation. In several but not all studies, the modal classification category is secure (Easterbrooks & Goldberg, 1984; Main & Weston, 1981; Schneider-Rosen & Rothbaum, 1993; but see Cox, Owen, Henderson, & Margand, 1992, and Grossmann, 1997). Nevertheless, at least in conventional two-parent families, infants seem to prefer their mothers as a haven of safety when they are distressed (Lamb, 1976). In the last two decades, influenced in part by prevailing social politics, developmental psychologists have attempted to demonstrate that mothers and fathers are interchangeable as caregivers. Measures of paternal sensitivity to infant signals in various contexts (paralleling Ainsworth's scales for maternal behavior) have not been found to predict secure infant–father attachment, however. Measures of reciprocity during play and a father's sensitive support of a child's exploration have emerged as the strongest predictors of secure classifications, suggesting that fathers promote their infants' security in different ways than do mothers (Cox et al., 1992; Grossmann, 1997; van IJzendoorn & DeWolff, in press). Belsky (1996) reported that in comparison to infant–mother attachments, infant–father attachments were more closely related to marital satisfaction and to both paternal and infant temperament. These data highlight the fact that the early infant–father relationship is subject in many respects to the mother–father relationship, which influences whether the father chooses and/or is permitted to enter the "circle" of the infant–mother bond (Solomon & George, 1996). The manner in which these complex family relationships come to influence the security of the infant's attachment to the father remains unknown.

Discussion

There can be little doubt that attachment classification by highly trained judges captures fundamental and far-reaching qualities of the infant–mother relationship. The reliability, stability, and predictive validity of Ainsworth's classification measure are well established in U.S. and Western European populations. However, important questions still remain about the psychometric properties and meaning of the measure for infant–father relationships, relationships with other caregivers, and attachment relationships in non-Western societies.

One of the most significant contributions of the method stems from its recognition of attachment relationship patterns or types, which has

permitted researchers to describe and explicate individual differences in early relationships in a parsimonious and predictively very powerful way (see Weinfield et al., Chapter 4, this volume). Ainsworth's observational and coding skills remain unsurpassed. Indeed in a recent set of meta-analyses, van IJzendoorn noted that the magnitudes of the associations between theoretically important variables reported by Ainsworth have yet to be matched by other researchers (DeWolff & van IJzendoorn, in press; van IJzendoorn, Vereijken, & Riksen-Walreven, in press). It should not be forgotten, however, that the A-B-C groups were based on the study of a middle-class sample of only 23 mothers and infants, observed three decades ago. As researchers have investigated larger samples and high-risk groups, inconsistencies and gaps as well as new research opportunities have emerged. For example, Belsky et al. (1996) recently reported less than 50% short-term stability of A-B-C classifications. The sample for this study was considerably larger than that studied in early stability samples (Connell, 1976, cited in Waters, 1982; Main & Weston, 1981; Waters, 1979). Mothers' work patterns and the degree of father's involvement in the lives of very young children have also changed considerably since the early work was undertaken. A replication of Belsky et al.'s finding would raise important new questions and force us to revisit assumptions about attachment stability.

The disorganized/disoriented group would not have been identified had researchers not attempted to replicate early findings in larger and atypical populations, and had they not been open to unexpected variations in strange situation behavior (Main & Solomon, 1990). Although more information is required regarding the demarcation, etiology, and sequelae of the D category, findings from several studies strongly suggest that the explanatory power of Ainsworth's methodology is increased when this category is included in the study. As researchers focus on additional and larger groups of various risk samples, stable subgroups within this very heterogeneous category may yet be identified (Solomon & George, in press; Teti, in press).

We would also like to note an important methodological implication of Ainsworth's reliance on a categorical approach to qualitative differences in attachment. This approach reflected her background in clinical assessment, as well as her conviction that the patterns of behavioral constellations, rather than individual differences in particular behaviors, distinguish types of attachment (Ainsworth & Marvin, 1995). Statistically less sensitive than dimensional measures, categorical systems require larger samples to establish reliable group differences. Many researchers who make use of Ainsworth's classification system (or other systems derived from it) are forced to reduce variability to a simple secure–insecure dimension because of inadequate sample size, usually in the insecure groups. As a result, these studies are unable to provide complete validation of the three- and four-group classification systems. When the literature is based on small samples, researchers are also at risk of deriving false conclusions from inconsistencies in results that arise simply from sampling error.[4]

Infant classification procedures have become so closely identified with the construct of security that it is difficult for either new or established attachment researchers to conceive that different or additional measures may be necessary or feasible. In part, this state of affairs reflects the simple brilliance of the strange situation procedure: It is hard to imagine another situation that can as reliably and ethically activate attachment behavior in the second year of life. The procedure makes use of a "natural cue to danger" (Bowlby, 1973), separation from the attachment figure, to activate the attachment system. The use of distinct episodes allows the coder to observe the infant's immediate response to particular events and the coherence of behavior across episodes. Furthermore, the situation appears to provide the "right" amount of stress. Too little stress does not activate the attachment system adequately, judging by the results of home observations (e.g., Ainsworth et al., 1978; Vaughn & Waters, 1990), and therefore may not allow critical distinctions among insecure groups to be revealed. Very high stress, such as that provided by repeating the procedure twice in 2 weeks, appears to result in a breakdown of defensive strategies, again obscuring important differences among groups. Finally, given that the primary threat to the child in the strange situation is a (transitory) threat to the relationship, the inferential leap from an observed pattern of attachment behavior to the infant's confidence regarding the psychological responsiveness of the caregiver seems to be a relatively modest one.

Whatever its appeal, from a technical standpoint the validity of the security construct as measured by the strange situation requires its cross-validation with one or more other measures of security. Since the validation of the single alternative measure of security in early toddler-

hood, the AQS, is still at an early (though promising) stage, it is fair to conclude that construct validation for attachment classifications has yet to be established definitively. We hope that this rather unsettling realization will inspire researchers to participate in the validation of the AQS measure, as well as to devise other alternative measurement approaches.

CLASSIFICATION OF ATTACHMENT RELATIONSHIPS IN THE PRESCHOOL AND KINDERGARTEN PERIOD

Investigators have followed two approaches to developing classification systems for children's attachment behavior beyond infancy. The dominant approach is based on an assumption of continuity between infancy and older ages, with allowances for developmental changes in the actual behaviors indicative of one or another type of relationship. Beginning with the challenges of interpreting the strange situation behavior of children older than 18 months, Marvin (1977) and later Schneider-Rosen (1990) developed general guidelines to identify the traditional Ainsworth classification groups among toddlers. These researchers modified assessment criteria developmentally; for example, the timing and quality of distance interaction (including talking) was used as an index of security, instead of the proximity seeking and contact maintenance of the very young child. Marvin also emphasized the importance of considering additional aspects of parent–child interaction, such as the quality of parent–child negotiations around departures and reunions, as an index of the quality of the goal-corrected partnership that begins to emerge in the older toddler (Bowlby, 1969/1982, 1973, 1980).

The first major effort along these lines was that of Main and Cassidy (1988), who attempted to apply the continuity framework to developing a set of classification criteria for 6-year-olds. This system was developed using children whose infant attachment classifications were known. This effort was followed by the work of Cassidy, Marvin, and the MacArthur Working Group on Attachment, who attempted to adjust the kindergarten system downward to develop a classification system for the preschool-age child (2½ to 4½ years old). Both systems can therefore be said to be founded on *a priori* notions of developmental transformation in the early years of life, as informed by careful and extensive observations of children in the various age ranges.

The second approach, called by Crittenden (1992a, 1992b, 1994) the "dynamic-maturational approach," emphasizes dynamic changes in the quality of attachment that arise from the interaction between maturation and current experience. Based on the concept of developmental pathways, this approach emphasizes more strongly than the continuity approach the possibilities for changes in quality of the attachment relationship over time. In addition, greater emphasis is placed in this system on inferences regarding the function of the child's behavior toward the parent. Crittenden originally participated in the MacArthur Working Group, so that there are strong similarities between her system and the Cassidy–Marvin system, as well as subtle but nonetheless significant differences. In both systems, attachment groups are distinguished by identifying the communicative or defensive goals that underlie attachment patterns. In both, the avoidant pattern is viewed as a defensive behavioral strategy organized around the goal of decreasing the probability of emotional involvement or confrontation. In Crittenden's Preschool Assessment of Attachment (PAA), however, this defensive strategy includes both cool or neutral avoidance of the parent (as in the Main–Cassidy and Cassidy–Marvin systems) and behavior that might be seen as somewhat role-reversed (i.e. placating, guiding, or acting solicitously toward the parent). The latter, according to Crittenden, is linked to cool neutrality by the fact that in both strategies, the child takes the major initiative in regulating proximity and communication with the parent.

Both approaches to preschool attachment use the strange situation procedure, especially the two separations and reunions of the original. Some investigators have introduced variations to accommodate the older age of the children, such as longer separations (Moss, Parent, Gosselin, Rousseau, & St-Laurent, 1996; Stevenson-Hinde & Shouldice, 1995). Other variations include changing the role and/or gender of the stranger (DeMulder & Radke-Yarrow, 1991; Stevenson-Hinde & Shouldice, 1990), changing the instructions to the caregiver (Cassidy & Marvin, 1987, 1990, 1991, 1992), and blending the strange situation with other laboratory tasks and procedures (DeMulder & Radke-Yarrow, 1991; Stevenson-Hinde & Shouldice, 1995). There has been no systematic determination of whether these variations materially affect the reunion behavior of the

children. Although the Main and Cassidy system for 6-year-olds was developed earlier, we present information about the Cassidy–Marvin and Crittenden systems first because they apply to chronologically younger children.

The Cassidy–Marvin System and the Work of the MacArthur Group

The Cassidy–Marvin system (Cassidy & Marvin, 1987, 1990, 1991, 1992) for preschool-age children provides guidelines for a "secure" group (B) and four "insecure" groups as follows: "avoidant" (A), "ambivalent" (C), "controlling/disorganized" (D), and "insecure/other" (IO). Each classification group includes a set of subgroups, including types that expand upon the infant subgroups. A brief description of classification criteria is shown in Table 14.3, and we summarize information on reliability and validity below.

Reliability

Intercoder Agreement. The majority of researchers using the Cassidy–Marvin system par-

TABLE 14.3 Early Childhood Laboratory Separation–Reunion Classification Systems: Major Classification Groups

Group	Cassidy–Marvin	PAA	Main–Cassidy
B	*Secure:* Uses parent as secure base for exploration. Reunion behavior is smooth, open, warm, positive.	*Secure/balanced:* Relaxed, intimate, direct expression of feelings, desires. Able to negotiate conflict or disagreement.	*Secure*: Reunion behavior is confident, relaxed, open. Positive, reciprocal interaction or conversation.
A	*Avoidant*: Detached, neutral nonchalance, but does not avoid interaction altogether. Avoids physical or psychological intimacy.	*Defended*: Acts to reduce emotional involvement or confrontation. Focuses on play and exploration at expense of interaction.	*Avoidant*: Maintains affective neutrality; subtly minimizes and limits opportunities for interaction.
C	*Ambivalent*: Protests separation strongly. Reunion characterized by strong proximity-seeking, babyish, coy behavior.	*Coercive*: Maximizes psychological involvement with parent; exaggerates problems and conflict. Is coercive, for example, threatening (resistant, punitive) and/or disarming (innocent, coy)	*Ambivalent*: Heightened intimacy and dependency on parent. Reunion characterized by ambivalence, subtle hostility, exaggerated cute or babyish behavior.
D	*Controlling/disorganized*: Characterized by controlling behavior (punitive, caregiving) or behaviors associated with infant disorganization.		*Controlling*: Signs of role reversal: punitive (rejecting, humiliating) or caregiving (cheering, reassuring, falsely positive).
A/C		*Defended/coercive:* Child shows both defended and coercive behaviors, appearing together or in alternation.	
AD		*Anxious depressed:* Sad/depressed; stares, extreme distress/panic.	
IO or U	*Insecure/other*: Mixtures of insecure indices that do not fit into any of the other groups.	*Insecure/other*: Mixture of insecure indices; acts incoherently in relation to parent.	*Unclassifiable*: Mixture of insecure indices that do not fit into any of the other groups.

Note. Cassidy–Marvin, Main–Cassidy: Organized groups = A, B, C. PAA: Organized groups = A, B, C, A/C.

ticipated in the MacArthur Working Group on Attachment (a collection of attachment researchers who collaborated to create the system), report establishing reliability with this group, and/or brought in a classification judge who established reliability on the system. The MacArthur Group requires a minimum of 75% agreement for certification. The range of training reliability scores reported in published studies includes percentages a bit lower: 75–92% (Achermann, Dinneen, & Stevenson-Hinde, 1991; Bretherton, Ridgeway, & Cassidy, 1990; Cassidy et al., 1990; Cicchetti & Barnett, 1991; Crittenden & Claussen, 1994; Easterbrooks, Davidson, & Chazan, 1993; Greenberg, Speltz, DeKlyen, & Endriga, 1991; Marvin & Pianta, 1996; Moss et al., 1996; Shouldice & Stevenson-Hinde, 1992; Speltz, Greenberg, & DeKlyen, 1990; Stevenson-Hinde & Shouldice, 1995; Turner, 1991).

Short-Term Stability. There are no published studies of short-term stability.

Relation to Other Measures of Attachment Security

Some convergence between Cassidy–Marvin classifications and concurrent representational measures of attachment security has been demonstrated, especially for the secure–insecure dichotomy. It must be emphasized, however, that the representational measures are also new and that their validity has not been independently and thoroughly established. (See the section on representational measures, below.) Classification as secure versus insecure with the Cassidy–Marvin system significantly predicted classification as secure versus insecure with Bretherton's doll-play attachment representation measure (Bretherton et al., 1990) and was significantly related to scales designed to capture qualities of secure attachment representation in the Separation Anxiety Test (SAT; Shouldice & Stevenson-Hinde, 1992). In neither study were investigators able to discriminate among the insecure reunion classifications with the representational measures. It is unclear whether this reflects a shortcoming in one or both types of security measures. Posada, Waters, Marvin, and Cassidy (in press) report no relation between concurrent AQS assessment and Cassidy–Marvin classifications.

Prediction to Core Variables

Mother–Child Interaction. There are a limited number of studies demonstrating the validity of Cassidy–Marvin classifications with respect to core theoretical predictions. Detailed descriptive work on mother–child relationships in the home, particularly with a focus on maternal behavior in situations in which the attachment system is presumed to be activated, has not yet been carried out. Based on brief observations in the home and laboratory, however, Stevenson-Hinde and her colleagues found some predicted differences between the secure and insecure groups in measures of mothers' sensitivity, socialization, and positive involvement with their children. Differences between the secure and the various insecure groups were revealed in one type of situation or the other, depending upon the group (Acherman et al., 1991; Stevenson-Hinde & Shouldice, 1990, 1995). Moss, Rousseau, Parent, St-Laurent, and Saintonge (1998) found overall smoother and more positive interaction during a brief free play between mothers and secure 5- to 6-year-olds, in comparison to dyads in which the children were judged insecure. In both samples, dyads with children judged controlling were characterized by the poorest mother–child coordination. Crittenden and Claussen (1994) found no relation between Cassidy–Marvin classifications and ratings of maternal sensitivity in a brief play situation, but did find a difference between mothers of secure and insecure children in maternal involvement and positive affect during laboratory cleanup. Studies in non-normative samples provide indirect evidence to suggest that classification reflects differences in maternal behavior. Maltreated children were more likely to be classified as insecure, especially D (controlling/disorganized) or IO (insecure/other) (Cicchetti & Barnett, 1991). Manassis, Bradley, Goldberg, Hood, and Swinson (1994) found that only 25% of children were secure in a sample of preschoolers with anxiety-disordered mothers; 65% of the children were rated as D or IO. Children whose mothers were rated as unresolved with respect to the children's diagnosis of a chronic, debilitating disorder were also more likely to be classified as insecure (Marvin & Pianta, 1996). Finally, Marcovitch et al. (1997) found that the distribution of attachment classifications among Romanian adoptees differed significantly from that of a normal comparison sample, with D the most common classification. (See Note 1.)

Continuity. There is only one report addressing continuity of classification. Cassidy et al. (1990) reported 66% stability of A-B-C classifi-

cation groups from infancy to age 3 for a sample of 53 children. Stability was found mainly in the secure group, whereas children judged as avoidant and resistant in infancy with the strange situation were more likely at age 3 to be judged as secure with the Cassidy–Marvin system. This estimate of continuity is somewhat lower than that obtained over longer periods of time (see the discussion of the Main–Cassidy system, below) and could suggest that the Cassidy–Marvin system overestimates the numbers of secure relationships in the preschool years.

Coherence. A few studies report differences between secure and insecure children in other developmental domains. Secure children appear to be more cooperative with their mothers in brief laboratory tasks (Acherman et al., 1990; Cassidy et al., 1990), are less likely to show behavioral problems in the clinical range (Moss et al., in press), and are less likely to be diagnosed with conduct disorders in clinical populations (Greenberg et al., 1991; Speltz et al., 1990). In the one study focusing on peer relationships, secure children were found to be less gender-stereotyped in behavior than insecure children (Turner, 1991).

Cross-Cultural Studies and Other Relationships. The Cassidy–Marvin system has been used to study attachment in the United States and England. There is no published information on preschooler attachment in countries or cultures other than these, on the father–child relationship, or on relationships with other caregivers.

The Preschool Assessment of Attachment

Crittenden's PAA (Crittenden, 1992b, 1994) provides guidelines for six major classification groups as follows: "secure" (B), "defended" (A), "coercive" (C), "defended/coercive" (A/C), "anxious depressed" (AD), and "insecure/other" (IO). Each classification group includes a set of subgroups, including typologies that expand upon the infant classifications by integrating a maturational/developmental perspective on preschooler behavior into the system. Classification criteria are shown in Table 14.3. Despite the apparent overlap with the Cassidy–Marvin system in group designations, it should be noted that the PAA depends upon an expanded set of criteria, including inferred regulation of internal feeling states, parent–child negotiation, the responsiveness of the attachment figure, and the observer's affective response to interaction. Published papers using the PAA are based on children ranging in age from 21 months to 65 months.

Reliability

Intercoder Agreement. Investigators report high intercoder agreement with Crittenden (80–90%) and within laboratories (82–87%) (Crittenden & Claussen, 1994; Fagot & Pears, 1996; Teti, Gelfand, Messenger, & Isabella, 1995). No cross-laboratory reliability figures are available.

Short-Term Reliability. There are no studies of short-term reliability.

Relation to Other Attachment Measures

There is no information regarding the association of PAA classifications with measures of child attachment in the home. Crittenden and her colleagues, however, used both the Cassidy–Marvin system and the PAA to classify two samples of preschoolers—one a maltreatment group, the other a heterogeneous community sample that included some maltreated children (Crittenden & Claussen, 1994). Agreement on main classification group (with PAA Groups A/C, AD, and IO treated as equivalent to Cassidy–Marvin Group D) between the two systems was poor (38% and 39%). These figures, however, partially reflect the fact that Crittendon "forced" the very high proportion of Cassidy–Marvin IO classifications into the otherwise best-fitting A, B, or C group. Within the Cassidy–Marvin system, these cases would have been combined with the D group. Agreement between the two systems on a secure–insecure split was 82% in the maltreatment sample, but only 64% in the community sample. Agreement for insecure classifications was considerably better than for secure classifications in both samples. This result exemplifies the serious lack of consensus about what constitutes secure behavior in the preschool years, and the corresponding lack of fundamental descriptive data on parents and children at this age.

Prediction to Core Variables

Mother–Child Interaction. The PAA involves an explicit departure from the Ainsworth system and its descendants, and predictions regarding maternal behavior differ slightly as well (Critten-

den, 1992a). Secure attachment is predicted to be related to sensitive, stable mothering; the defended pattern is believed to reflect a predictable negative parental response to a child's display of negative affect; and the coercive pattern is believed to reflect unpredictability (whether this is unpredictability in response to a child's positive and/or negative affect or in general living circumstances is not specified). These predictions have been partially tested in brief, semistructured home and laboratory observations. Mothers of secure children received highest ratings for sensitivity, low controllingness, positive involvement, and positive affect. Mothers of defended children showed little involvement in cleanup in the laboratory, but otherwise the groups of insecure children's mothers were not differentiated (Crittenden & Claussen, 1994). In a study of normative, middle-class children, Fagot and Pears (1996) found that children who moved from either security or avoidance at 18 months to coerciveness at 30 months had mothers who differed from their stable counterparts, but not in ways that clearly indicated unpredictability of the mothers' behavior toward the children. Finally, indirect evidence of differences in maternal behavior is suggested by links among PAA patterns, maltreatment history, and maternal depression. Crittenden and Claussen (1994) found secure attachments to be modal among nonmaltreated infants; the mixed A/C pattern was significantly associated with maltreatment. Teti et al. (1995) found that the AD and IO patterns were, as would be expected, particularly common in a sample of preschoolers whose mothers were depressed.

Continuity. The PAA explicitly predicts discontinuity—a shift from a defended pattern of attachment to a coercive one—in some proportion of children as a reflection of unpredictability in maternal behavior and maturational changes in children from infancy to preschool age. In the study referred to above by Fagot and Pears (1996), a normative sample of mother–toddler dyads was assessed when the children were 18 and 30 months and 7 years of age. They found shifts from A to C and the reverse in the preschool period, with an overall increase in C classifications from 10% to 36% of the sample. Disorganized/disoriented attachment classifications were not made at 18 months; since it is likely that this group overlaps with both A and C in the PAA system, it is difficult to evaluate the actual discontinuity in attachment relationships.

Coherence. Specific relations between PAA patterns and maladaptive development, both at home and with peers, have been predicted. In line with predictions, Crittenden and Claussen (1994) found maternal ratings of social withdrawal to be associated with the defended pattern, but was unable to show that A and C children differed from one another as predicted with respect to conduct disorder, anxiety, and attentional difficulties. Fagot and Pears found that the coercive pattern predicted teacher reports of poor peer relationships at age 7.

Cross-Cultural Studies and other Relationships. The PAA has been used in studies of normative and high-risk samples in the United States. There are no published studies of the PAA as a measure of security in other relationships (e.g., father–child, other caregiver–child).

The Main–Cassidy Attachment Classification for Kindergarten-Age Children

The Main and Cassidy (1988) attachment classification system for kindergarten-age children was developed on a sample of 33 children whose infant attachment classifications in the strange situation (A, B, and D) were known and who had experienced no major change in caretaking relationships. The system was further tested and extended on a new sample of 50 children that afforded enough C children to establish classification guidelines for this group. Classification is based on a child's behavior during the first 3 or 5 minutes of reunion with the parent following a one-hour separation, rather than on the episodes and timing of the strange situation. Guidelines are provided for five major classification groups: "secure" (B), "avoidant" (A), "ambivalent" (C), "controlling" (D), and "unclassified" (U). Criteria for subgroup classifications are also provided. Rating scales for security and avoidance have also been developed. The major criteria for classification are shown in Table 14.3.

Reliability

Intercoder Agreement. In the majority of studies, intercoder reliability between Main or Cassidy and other investigators ranges from 70% to 82% (Cassidy, 1988; Cohn, 1990; Main & Cassidy, 1988; Wartner et al., 1994). Intercoder agreement on the security and avoidance rating

scales is in the same range. However, in one study completed before the system was finalized, agreement between expert coders was 52%, with the majority of disagreements involving the controlling (D) category (Solomon, George, & Silverman, in press).

Short-Term Stability. Stability of classification over a 1-month period in Main and Cassidy's sample of 50 was 62%. Instability was largely due to change involving the controlling group. Given that (as noted below) long-term continuity of classification is much higher, it is likely, as with infant classifications, that instability in part reflects sensitization to the test situation.

Relation to Other Measures of Security

Main–Cassidy classifications have been shown to be strongly related to classifications based on two different procedures for classifying children's representation of attachments. We (Solomon, George, & De Jong, 1995) reported 79% agreement (kappa = .74) between Main–Cassidy classifications and classifications based on children's responses in a structured doll-play situation. Agreement between the systems was very high for children in the secure, ambivalent, and controlling groups, but lower for those in the avoidant group. A high level of agreement between Main–Cassidy classifications and classifications of children's responses to pictures of attachment-related events has also been reported (Jacobsen, Edelstein, & Hofmann, 1994; Jacobsen & Hofmann, in press). Slough and Greenberg (1990) found that ratings of child security, as assessed from children's responses to the SAT (Hansburg, 1972; Klagsbrun & Bowlby, 1976), were positively related to Main–Cassidy security ratings during reunion. (For a full description of these studies, see the section on representational measures, below.)

Prediction to Core Variables

Mother–Child Interaction. We (Solomon et al., in press) found significant correlations between ratings based on Main–Cassidy classifications of security, avoidance, and ambivalence and observer sorts of maternal behavior in the home (Maternal Caretaking *Q*-Sort). Security was related to age-appropriate maternal involvement and support; avoidance to rejection and affective distance; and ambivalence to indulgent and infantalizing behavior. Mothers of children rated high in controlling behavior were distinguished solely by high scores on the *Q*-sort item "Treats child like a playmate or companion."

Continuity. In their original development study, Main and Cassidy (1988) reported a match of 82% (kappa = .76) between 12-month and 6-year A-B-C-D classifications with mothers and 62% stability (kappa = .28) in classifications with fathers. Wartner et al. (1994) reported an 82% match in classifications with mothers (kappa = .72) over the same period in their independent German sample.

Coherence. Cohn (1990) and Wartner et al. (1994) have investigated the links between classifications at age 6 and social competence and peer acceptance in school. In both studies, the securely attached children were judged to be more socially competent and accepted than the insecurely attached children, although the studies differed as to which insecure group showed the greatest deficit (C or A, respectively). Paralleling these findings at the representational level of assessment, Cassidy (1988), found that secure children had more positive representations of peers' feelings, as assessed from social problem-solving vignettes, than did insecure children. We (Solomon et al, 1995) found that middle-class controlling and unclassifiable kindergarten children showed the highest levels of behavioral problems (especially hostility) at home and school, but that the secure, avoidant, and ambivalent groups did not differ significantly on these measures. Secure versus insecure Main–Cassidy classifications have also been found to be related to representational measures of self-esteem and attachment, with secure children judged to be more open about themselves and about feelings of vulnerability than insecure children (Cassidy, 1988; Slough & Greenberg, 1990).

Cross-Cultural Studies. The Main–Cassidy system has been used in the United States, Iceland, and Germany.

Discussion

Given the range of options for attachment classification in early childhood, readers may find themselves perplexed as to which system is most appropriate for their own research. At present, there are two classification systems available for the preschool period—the Cassidy–Marvin sys-

tem and the PAA. To complicate matters further, a few investigators (Easterbrooks et al., 1993; Moss et al., 1996, 1998) have recently extended the use of the Cassidy–Marvin system to classification of attachment in kindergartners, the age range of the Main–Cassidy system.

The greater ambiguity at present surrounds the measures for the preschool range proper (i.e., 21 to 48 months). The Cassidy–Marvin and PAA systems overlap in several areas, but they differ just enough to make comparisons difficult. Both systems rely on inferences regarding a child's attachment strategy with respect to a parent, but on somewhat different bases. A key conceptual difference concerns what constitutes a disorganized attachment strategy. In the Cassidy–Marvin system, behavior that either is clearly disorganized or is aimed at controlling the parent can result in placement into the D category. The link between these morphologically different behaviors is supported by continuity in these categories between infancy and age 6 (Main & Cassidy, 1988) and by the finding that children who were classified as controlling at age 6, on the basis of reunion with their parents were judged to be disorganized at the level of representation on the basis of a doll-play measure (Solomon et al., 1995). In contrast, the PAA defines as organized any strategy that is coherent and whose goal in the immediate situation is apparent. Thus it places greater emphasis on a parent's behavior and a child's response in the moment, and it requires a more abstract level of inference.

Although the overlap between Cassidy–Marvin and PAA classifications for identical cases is limited, both systems appear to capture at least some of the variance in preschool mother–child relationships. Secure classifications in both systems are related to global measures of positive/smooth interaction between a mother and child (Cassidy et al., 1990; Crittenden & Claussen, 1994; Fagot & Pears, 1996; Moss et al., in press; Stevenson-Hinde & Shouldice, 1995). Particular categories in both systems (Cassidy–Marvin: D, IO; PAA: A/C, AD, IO) seem to be closely associated with clinical antecedents (i.e., maltreatment, maternal depression, conduct disorders). Beyond these broad distinctions, however, the relative value, utility, or validity of one system over another cannot be determined at present.

A possible limitation to both preschool measures is their reliance on the brief separation and reunion episodes of the strange situation. Theoretically, the quality of attachment behavior will depend on the degree to which the attachment system is activated, and it is not clear that 2-, 3-, and 4-year old children will find a 3-minute separation sufficiently arousing. On the other hand, very long separations may also mask group differences by overstressing the attachment system (Slough & Greenberg, 1990). Research should begin to establish the optimal separation time for this age.

A long separation is part of the Main–Cassidy procedure for classifying attachment relationships at age 6. This may partly explain the comparative success researchers have had with this measure in finding unique and theoretically expected differences for each of the major classification groups at the older age. Maturational differences between kindergarten and preschool children may also result in differential validity of classification at the two ages. For example, in both the Main–Cassidy and Cassidy–Marvin systems, the quality (especially the elaboration and coherence) of verbal communication is a distinguishing characteristic of a securely attached child. In the preschool years, however, verbal skills are generally more limited and are still quite unevenly distributed. The classifier is forced therefore to rely on subtler (less reliable) behavioral indices. This greater variability in the behavior of preschoolers is reflected in the Cassidy–Marvin manual, which is both more inclusive and less precise in spelling out criteria for categorization than is the Main–Cassidy manual for older children.

This leads us to consider which system to use with children ages 5 to 7. If the kindergarten-age child is indeed "easier" to classify than the preschool-age child, researchers trained in the Cassidy–Marvin system should have little trouble using the Main–Cassidy system. Two groups of researchers have used the former to generate classifications for kindergarten-age children (Easterbrooks et al., 1993; Moss et al., 1996), with each group having established reliability on a small subsample with a coder trained in both systems.[5] This procedure may indicate that the Cassidy–Marvin system is identical to the Main–Cassidy system when used with older children, or it may reflect the skillfulness of one or both sets of researchers; however, it is not sufficient for establishing the validity of the Cassidy–Marvin system for children in the transition to the middle childhood period (cf. Moss et al., 1998). At present, therefore, investigators working with 5- to 7-year-olds would be well advised to rely on the Main–Cassidy system.

ATTACHMENT SECURITY MEASURES BASED ON SYMBOLIC REPRESENTATION

It is generally believed that infants and toddlers encode knowledge, including knowledge about their relationships with attachment figures, in terms of enactive or sensorimotor representation. Early in the preschool years, children begin to use symbolic forms of mental representation and to organize knowledge conceptually (Bretherton, 1985). These conceptual structures and processes can be observed in contexts in which a child is asked to develop scripts for actions and events. As a result of this developmental achievement, the child is ripe for assessments that tap internal working models of attachment. Internal representational models of relationships are believed to arise from actual experiences in a relationship. They have been conceptualized as consisting of both specific content, including affect, and information-processing rules that integrate and determine perception and memory (Bowlby, 1969/1982; Bretherton, 1985; Main, Kaplan, & Cassidy, 1985). Because of their link to experience, individual differences in these models can be expected to parallel individual differences in a child's actual behavior with an attachment figure; that is, they should be systematically related to measures of attachment security based on reunion and/secure-base behavior in early childhood and thereafter.

The measures that have been developed are of two kinds—those based on children's responses to pictured situations, and those based on children's doll-play narratives and enactment of attachment-related scenarios. Some researchers have attempted to develop classification schemes to parallel the Ainsworth system. Other researchers have developed scales to reflect aspects of attachment security or related constructs, but have not attempted to understand patterning of responses in such a way as to derive classifications.

Picture Response Procedures

Three interrelated measures have been developed to assess internal representations of attachment on the basis of children's responses to projective pictures or stories. Two measures (Kaplan, 1995; Slough & Greenberg, 1990) incorporate the procedures of the SAT, a picture response protocol that was first developed by Hansburg (1972) for adolescents and later modified for children ages 4–7 by Klagsbrun and Bowlby (1976). The procedure consists of a set of six photographs depicting attachment-related scenes ranging from mild (a parent says goodnight to a child in bed) to stressful (a child watches a parent leave). Each picture is introduced by an adult, and the child is asked to describe how the child in the picture feels and what that child will do.

Kaplan (1987) developed a classification system for children's responses to the pictures that differentiates attachment groups on the basis of children's emotional openness and ability to envision constructive solutions to feelings engendered by separation. The system was developed on a small sample of middle-class 6-year-olds whose attachment classifications with their mothers at 12 months were known. Children classified as "resourceful" (B) were able to discuss coping with separation in constructive ways. There was no evidence that they denied feelings of vulnerability, and no evidence that they became disorganized or disoriented. Children were classified as "inactive" (A) when they offered responses indicating feelings of vulnerability or distress at separation. but were at a loss to suggest ways in which the child in each picture might cope. Children classified as "ambivalent" (C) typically demonstrated a contradictory mixture of responses; for example, a child might seem angry toward the parent, but would shift to wanting to please the parent. Children were classified as "fearful" (D) on the basis of several types of responses: inexplicable fear, lack of constructive strategies for coping with separation, or disorganized or disoriented thought processes. Although Kaplan's classification system has been very influential in the design of other representational measures, information regarding its reliability and validity when used with the SAT pictures is limited to Kaplan's original study. She reached 76% reliability with a second trained judge on her sample of 38 children. Correspondence between SAT responses and infant strange situation classifications was 68% for the four groups (kappa = .55) (see Grossmann & Grossmann, 1991, for data relating to a small modification of Kaplan's procedures).

Jacobsen and her colleagues (Jacobsen et al., 1994; Jacobsen & Hofmann, in press) adapted Kaplan's classification system for use with a series of pictures depicting a long separation from parents (Chandler, 1973). These investigators were unusually thorough in establishing the validity of the measure. As in Kaplan's study, Jacobsen et al.'s Icelandic children were 7 years old when assessed. Judges were trained by Kaplan

and established excellent within-laboratory agreement (kappa = .80–87). Short-term stability 1 year later was substantial (kappa = .78). Representational classifications agreed closely with concurrent classifications based upon reunion behavior (Main & Cassidy, 1988): Agreement on secure versus insecure classifications was 89%, and for the three groups (B, A, D) it was 80%. Representational classifications also showed significant correspondence to strange situation classifications completed when the children were 18 months of age (82% agreement on main groups). Finally, secure versus insecure representational classification (especially the D pattern) successfully predicted the following theoretically related variables for children between the ages of 7 and 15, even when differences in IQ were controlled for: performance on cognitive-developmental tasks, self-esteem, teacher-reported attention and participation in class, insecurity about self, and grade point average. Classification was unrelated to emotion recognition for the Chandler pictures and to teacher-rated extraversion and disruptive behavior.

A limited amount of information is available about a third representational measure of attachment security, designed by Slough and Greenberg (1990). These investigators used the SAT pictures and developed four scales, apparently adapted from Kaplan's early classification criteria (Main et al., 1985), to rate attachment security. The attachment scales (acknowledgment of separation-related affect in stressful separations; statements of well-being in mild separations) were positively related to security ratings (Main & Cassidy, 1988) of 5-year-olds upon reunion with their mothers following a 3-minute separation, and negatively related to ratings of avoidance. Representation ratings were unrelated, however, to reunion behavior following a second, longer (90-minute) separation. Since the Main–Cassidy ratings were based on nonstandard separation–reunion procedures, the validity of the findings is open to question. No information is available regarding intercoder reliability or test–retest stability of the Slough and Greenberg measure.

Doll Play

A second approach to developing representation-based attachment security measures is founded on observation of children's doll play centering on attachment-relevant themes. Bretherton and her colleagues developed a doll-play procedure to assess attachment security in 3-year-olds; this procedure involves of a set of five stories (child spills juice, child hurts her knee, child "discovers" a monster in the bedroom, parents depart, and parents return). An adult introduces each story with a story stem that describes what has happened, and a child is asked to describe and enact what happens next. Bretherton developed a classification system that identifies the four main attachment groups (A, B, C, D). Detailed transcripts are made of children's verbal behavior and enactment of each story and classifications are based on children's predominant responses to the stories. Separate criteria for each story were established on *a priori* grounds or based on Kaplan's (SAT) findings. Secure (B) children demonstrate coping behavior in relation to the attachment theme. For example, upon separation from parents, a secure child spontaneously (without prompting from the administrator) plays with the grandmother doll. Avoidant (A) children appear to avoid responding; for example, they request another story or say "I don't know." No consistent patterns have been identified for ambivalent (C) children. Children are classified as disorganized (D) if they give odd or disorganized responses—for example, throwing the child doll on the floor.

No intercoder or test–retest reliability figures are available. However, Bretherton et al. examined the concordance between secure and insecure doll-play classifications and corresponding classifications of children with the Cassidy–Marvin preschool system. A secure–insecure match was found for 75% of the 28 children. There was no match, however, for type of insecurity across the two measures. Doll-play classifications were converted to security scores and were found to be highly correlated with AQS security scores at 25 months and marginally correlated with (concurrent) AQS security scores at 37 months. Representation security scores showed significant, moderate relations to marital satisfaction, family adaptation and cohesiveness, child temperament (sociability, shyness), and language and cognition as assessed by the Bayley Scales of Infant Development. This broad network of correlations raises some question regarding the discriminant validity of the system.

We have developed a second approach to classification based on doll-play responses (George & Solomon, 1994; Solomon et al., 1995). This system focuses on the Bretherton et al. separation–reunion stories taken as a unit and was developed for kindergarten-age children. We also

introduced some changes to the Bretherton et al. procedures to facilitate symbolic play and enhance involvement.

The system identifies four attachment groups (classifications are based on complete transcripts of the children's verbal and behavioral responses): "confident" (B), "casual" (A), "busy" (C), and "frightened" (D). The basic criteria for the groups were developed on a pilot sample whose concurrent attachment classifications were known. Classification involves a consideration of both story content and structure. The stories of children in the pilot sample who were classified as confident (B) depicted themes of danger and rescue by competent adults. Symbolic play was constructive, and stories were integrated into coherent narratives. The stories of children classified as casual (A) depicted ordinary events portrayed in a schematic or stereotyped fashion. Explicit concerns about separation issues were minimized or absent, and family members were unavailable at reunion. The stories of children classified as busy (C) emphasized affectively positive themes of caregiving or having fun during the parents' absence. Reunions were delayed or interrupted, and narratives were highly digressive. The stories of children classified as frightened (D) were either chaotic and destructive or inhibited and constricted.

Intercoder reliability was 71% for the entire sample and 95% for disorganized (D) versus organized (A-B-C) classifications. The concordance between representation classifications and attachment classifications based on reunion behavior (Main & Cassidy, 1988) was 79% (kappa = .74). There are no stability studies and no published studies examining the relation between the representational classifications and other theoretically relevant variables for this system.

Other Representational Measures

Several investigators have presented preliminary findings on other promising security measures based on symbolic representation. For example, Kaplan and Main (1986) developed a preliminary classification system for use with kindergarten-age children's drawings of their families. Some investigators, including Kaplan, have reported concordance between this system (or slight modifications of it) and reunion behavior classifications (Fury, Carlson, & Sroufe, 1997; Main et al., 1985; Pianta, Longmaid, & Ferguson, in press); however, this finding has not been replicated in all studies (see Main, 1995) and thus may be seen as an interesting correlate of, but not a measure of, attachment (Main, personal communication, 1998). Cassidy (1988) developed a classification system based on children's doll-play responses to tap representations of the self in relation to the attachment figure. Classification based on doll play was significantly related to classification based on laboratory reunion (Main–Cassidy system); however, discrepancies between the systems were also substantial, so that the usefulness of this system as a measure of attachment representation is unclear. Other investigators have used variations of the picture or story stem procedures described above, along with rating systems or their own classification criteria, often derived from Kaplan's or Bretherton et al.'s security classification systems. Investigators typically report modest though significant relations between representational measures and other attachment measures or theoretically relevant variables (Oppenheim & Waters, 1995; Shouldice & Stevenson-Hinde, 1992).

Discussion

The development of attachment security measures based on children's symbolic behavior is a relatively new endeavor, and it is clear that there is much work to be done. Although these measures are at an early stage of development, their potential is twofold. First, the variety of children's symbolic behavior permits the development and comparison of different measures, which is necessary to establish construct validity. This has been an elusive goal for measures based on interaction. We encourage researchers to undertake the systematic cross-validation of these measures, especially with respect to the four core hypotheses we have outlined earlier in this chapter.

Second, investigators who have used representational materials in work with young children find them to be a rich source of information and a fruitful base for hypothesis generation. At their best, representational data reveal both the content and the structure of young children's thought, or, in Main's (1995) terms, "state of mind" regarding attachment. They may make it possible to explore psychologically important regulatory processes in young children, such as fantasy and defense, and to trace the links between children's and adults' construction of representational models. For this promise to be realized, investigators should take care to establish the congruence of new measures with interac-

tion-based measures of attachment security. This continues to be necessary because a high level of abstraction is inherent in the construct of an attachment representation, and children's cognitive and language development can influence the quality of their responses to representational stimuli.

One of the most encouraging signs from work with representational measures to date is the degree of overlap between systems in the classification criteria for the various attachment groups. These criteria have direct analogues to qualitative differences in parent–infant and parent–child interaction, as well as to representational processes already identified in adults. For example, the behavior of the secure infant and kindergartner is characterized by open and direct communication of affect and by active, persistent, and unambivalent expression of attachment behavior. Criteria for security in Kaplan's SAT classification system also include direct acknowledgment of affect (sadness, longing, anger) and a clear sense that reassurance or relief is forthcoming. In our own doll-play classification system, secure children symbolically depict separation anxiety as well as confidence in the favorable resolution to these fears and concerns. Furthermore, the cognitive complexity and narrative structure of their play clearly parallel the coherence and integration of thought characteristic of the attachment representations of secure adults (Main, 1995).

We briefly note two areas that need special attention as measures continue to be refined. First, we encourage investigators to develop measures directly from the representational material produced by a particular procedure, instead of relyong in *a priori* considerations alone or "borrowing" criteria from one measure and applying them to another. For example, it appears that in response to SAT stimuli, avoidant children will often say "I don't know." We find that this response is not characteristic of avoidant children when responding to doll-play scenarios; when repeated or mixed with other "response-avoidant" tactics, it is instead characteristic of some disorganized/controlling children. Transfer of Kaplan's picture-based criteria to doll-play materials may be one reason why, for example, Bretherton et al.'s doll-play classification system has failed to distinguish among insecure classification groups.

Researchers should also consider the degree to which representational procedures activate the attachment system. Our experience in comparing the responses of children ages 3 through 7 to the Bretherton et al. procedure (George & Solomon, 1996a), suggests that different stories result in better discrimination between classification groups at different ages. In the stories of 3-year-olds, we see clearer distinctions in response to the "monster in the bedroom" story than to any of the other stories, including the separation–reunion scenario. In older children, we see clearer distinctions among the classification groups in response to the "hurt knee" and "separation–reunion" story stems, and less distinctiveness in response to the "monster" story. These differences may reflect an interaction between the attachment system and cognitive development. For the young preoperational child—who is unable to distinguish between reality and fantasy, and whose perceptions of the world are driven by appearances (Flavell, 1986)—imaginary monsters are real and scary. This story may more readily activate the attachment system and the corresponding internal working model of attachment than other stimuli. For the concrete operational child (ages 5 to 7)—who is able to distinguish between fantasy and reality, is not driven by appearances, and is in a new "practicing" phase with respect to autonomy—the "hurt knee" and "separation–reunion" stories may be sufficiently evocative to activate the attachment system. Indeed, by the time children reach age 7 or so, the thought of an overnight separation from the parents is no longer very disturbing; children's stories then become more matter-of-fact. When these materials are used toward the end of the age range, therefore, it may be necessary to modify the scenario to evoke clear individual differences in attachment representations.

THE ATTACHMENT *Q*-SORT: INFANCY THROUGH 5 YEARS

In contrast to systems of classifying child behavior and representation, the AQS assesses the quality of a child's secure-base behavior in the home. The system was developed by Waters to provide a practical alternative to the Ainsworth home observation narratives. Within the AQS system, "secure-base behavior" is defined as the smooth organization of and appropriate balance between proximity seeking and exploration (Posada, Gao, et al., 1995). The *Q*-set for the AQS consists of 90 items designed to tap a range of dimensions believed to reflect either the secure-base phenomenon itself or behavior associ-

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ated with it in children ages 1 to 5. These items are sorted into one of nine piles, according to whether the item is considered characteristic or uncharacteristic of a child's behavior. Sorts can be completed by trained observers or by parents. Waters (1995) recommends that sorts by observers should be based on two to three visits for a total of 2–6 hours of observation in the home, with additional observations if observers fail to agree.

The AQS permits the salience of a behavior in the child's repertoire to be distinguished from the frequency with which the behavior occurs. In addition, it helps to prevent observer biases and lends itself to an array of qualitative and quantitative analyses. AQS data can be analyzed in terms of individual items or summary scales, or they permit a comparison of the child's *Q*-sort profile to a criterion sort. Waters (1995) has developed criterion sorts for the construct of attachment security and for several other constructs (social desirability, dependence, sociability) by collecting and averaging the sorts of experts in the field. The child's security score is the correlation coefficient between the observer's sort and the criterion sort, and it represents the child's placement on a linear continuum with respect to security. Although some researchers have used different criterion sorts for the second and fourth years of life, E. Waters (personal communication, 1997) now recommends the use of a single criterion across this age range (12 to 60 months). Validated sorts for the A, C, or D insecure attachment groups defined by the strange situation are not available, although some researchers have developed classifications on *a priori* grounds for particular purposes (e.g., Howes & Hamilton, 1992; Pederson & Moran, 1995).

Validation of the Measure

Reliability

Intercoder Agreement. In comparison to classification systems, reliability on the AQS does not require extensive training or certification of reliability. Studies report interobserver reliability (correlations between sorts) ranging from .72 to .95. The correlation between mothers' and trained observers' sorts tends to be moderate in small to moderate-size samples (approximately 35 to 60 subjects), but improves considerably as a function of training and supervision of mothers and the degree to which observers are trained and have opportunity to see a sufficient range of child behavior (Teti & McGourty, 1996). We return to this issue at the conclusion of this section.

Short-Term Stability. Short-term stability of parent-generated AQS security scores varies considerably across studies (.04 to .75) (Bretherton et al., 1990; Teti, Sakin, Kucera, Corns, & Das Eiden, 1996; van Dam & van IJzendoorn, 1988). Observer sorts of children's separations and reunions at day care at 6-month intervals from 18 to 42 months (Howes & Hamilton, 1992) were at the low end of this range (r = .04–.39), and no stability was shown for observer sorts in a Japanese sample (Vereijken & Kondo-Ikemura, in press).

Relation to Other Measures of Attachment

AQS security scores have been found to differentiate 12- to 18-month-old infants classified as secure or insecure in the strange situation in several but not all published studies (Belsky & Rovine, 1990; Bosso, Corter, & Abramovitch, in press; Bretherton et al., 1990; Mangelsdorf et al. 1996; Sagi et al., 1995; van Dam & van IJzendoorn, 1988; Vaughn & Waters, 1990). The strength of the relation tends to be moderate, with average security scores for the secure group of about .50, and average security scores for the insecure groups of about .25. Paralleling Ainsworth's original finding, distinctive differences between children classified as A or C in the strange situation do not emerge clearly in the AQS data. In the preschool period, the relation between the AQS and other security measures is less certain. As noted earlier, Posada et al. (in press) failed to find a relationship between preschool reunion-based classifications and observer AQS scores. Bretherton et al. (1990) reported a strong correlation between maternal sorts completed at age 25 months and Bretherton's representational measure of attachment, but the relation between measures was considerably weaker when concurrent 37-month maternal sorts were used.

Prediction to Core Variables

Mother–Child Interaction. For the infancy period, scores or ratings of maternal sensitivity and competence based on brief home visits have been found in several studies to correlate moderately with observer and/or maternal AQS scores

(Pederson et al., 1990; Pederson & Moran, 1995; Schölmerich, Fracasso, Lamb, & Broberg, 1995; Teti, Nakagawa, Das, & Wirth, 1991; van Dam & van IJzendoorn, 1988). In the preschool period, Silverman (see Solomon et al., in press) found relations between AQS security scores and maternal *Q*-sort items reflecting maternal enjoyment, psychological availability, and authoritative control. More indirectly, researchers have found significant differences in AQS security of preschoolers whose mothers were classified as secure or insecure with the AAI (Posada, Waters, Crowell, & Lay, 1995).

In contrast to what has been found for strange situation classifications, Vaughn and Bost (Chapter 10, this volume) note that assessments of temperament, especially negative reactivity, show moderate correlations with AQS security. In a theoretically related set of findings, several studies report moderate concordance between mothers' and fathers' AQS security scores (Belsky & Rovine, 1990; Del Carmen, Pedersen, Huffman, & Bryan, in press; Howes & Markman, 1989; LaFreniere, Provost, & Dubeau, 1992). These findings suggest some limitation in the discriminant validity of AQS security, although the shared variance is not great.

Continuity. Belsky and Rovine (1990) reported low to moderate long-term stability between ages 1 and 3 (mothers: $r = .23$; fathers: $r = .53$; social desirability partialed out).

Coherence. AQS security in the infancy and preschool periods has been found to be related to higher-quality and more positive interaction with peers and siblings, and to lower levels of behavior problems (Bosso et al., in press; LaFreniere et al., 1992; Del Carmen et al., in press; Park & Waters, 1989; Teti & Ablard, 1990; cf. Belsky & Rovine, 1990). A variety of parental and marital variables (e.g., marital quality, social support, parenting stress) have also been shown to be related to AQS security (Howes & Markman, 1989; Nakagawa, Teti, & Lamb, 1992; Teti et al., 1991).

Cross-Cultural Studies. In a major study on the cross-cultural validity of the AQS, researchers determined that mothers and experts can discriminate attachment security from the constructs of dependency and social desirability in a range of countries (China, Japan, Israel, Columbia, Germany, Norway, United States) (Posada, Gao, et al., 1995). Although the structure of the data is broadly similar cross-culturally, the correlations of maternal sorts across cultures tend to be low (ranges = .15–.32) (see also Strayer, Verissimo, Vaughn, & Howes, 1995; Vaughn, Strayer, Jacques, Trudel, & Seifer, 1991). This suggests that ecological factors may have a powerful effect on the patterning of young children's secure-base behavior in the home.

Discussion

The great promise of the AQS lies in its emphasis on naturalistic observation in ecologically valid contexts. For the infancy period, there is correspondence with security or insecurity in the strange situation and with maternal sensitivity, suggesting that the AQS taps some of the variance associated with the construct of attachment security. Even for infants, however, the strength of relationship among these variables is moderate or low; there is also no direct evidence that classifications and AQS security are congruent in the preschool period (in part because there are so few studies). Because of their paradoxical finding that the strength of association between AQS security and attachment classification is weaker than that between AQS scores and maternal sensitivity, van IJzendoorn et al. (in press) raise the unsettling suggestion that these measures do not tap the same underlying construct. It is not to be expected—indeed, it may not even be desirable—for any two measures of a construct to be perfectly correlated. Nonetheless, it may be helpful to explore the sources of nonconvergence in order to better estimate and understand the underlying construct of security.

A besetting question for this method is whether mothers or trained observers are the more appropriate sources of secure-base data. There is empirical evidence of bias or measurement error in parental sorts. For example, Belsky and Rovine (1990) found that only when social desirability was partialed out of mothers' AQS descriptions could a relation to strange situation classifications be demonstrated. In comparison to observer sorts, maternal sorts are more likely to be correlated with temperament measures, suggesting that mothers' sorts are biased by their perceptions of their children's temperaments (van IJzendoorn et al., in press). Investigators have also demonstrated systematic (although apparently contradictory) differences between mother and observer sorts corresponding to children's strange situation classifications (Stevenson-Hinde & Shouldice, 1990) or to maternal sensitivity (Vereijken & Kondo-Ikemura, in

press). It is likely that these sorting biases reflect the same maternal information-processing biases that are believed to be causal factors in the development of the different types of attachment relationships (Cassidy & Kobak, 1988; George & Solomon, 1996b; Main, 1995).

Observers may be susceptible to different sorts of bias or error. The results of meta-analysis show that mothers' and observers' sorts predict strange situation classifications about equally well (or poorly) (van IJzendoorn et al., in press). Yet the association between maternal sensitivity and AQS security is considerably higher when observers sort than when mothers do. In contrast to the strange situation, a mother's behavior is not constrained in the home, and it is quite likely that the observer's impression of one partner influences his or her impression of the other. In Deane's original *Q*-sort study (Waters & Deane, 1985), and in Teti and McGourty's (1996) more recent effort, maternal and observer agreement was moderate to very strong (.50–.80) when observers had sufficient opportunity to see relevant child behavior. If an observer's perceptions as he or she learns more about a child become more like a mother's, which is the more accurate observer?

In our view, the lack of congruence between the AQS and strange situation classifications is rooted in the different contexts of the home and of the laboratory separation and reunion. In the placid and relatively safe environment of the middle-class home, there is little to activate the attachment system. Consequently, a certain amount of what is observed in the home is quite likely to be a function of child temperament (including sociability), the immediate physical and social environment, the family milieu (e.g., marital harmony), and more transitory influences (e.g., the health, mood, and current activities of the participants). That is, the AQS as generally employed will necessarily be imprecise with respect to a child's generalized expectations regarding maternal availability and responsiveness, which are what are believed to be assessed in the strange situation. The context of observation can be expected to be increasingly important past infancy, since situations that strongly activate attachment are very rarely observed in the home as children mature (Solomon et al., in press). Observations of mothers and children under more stressful or threatening conditions (e.g., busy parks, stores, doctors' offices, airports) might increase the convergence of AQS scores with reunion-based classifications and allow the quality of the attachment relationship to be disentangled from other influences in the home.

The effect of context on measures of attachment security may be even more complex. Ainsworth et al. (1978) noted that discrepancies between patterns of secure-base behavior in the home and attachment classifications could often be explained by recent changes in maternal sensitivity. Thus home observations may be rather accurate as to the current state of a mother–child relationship, but the child's expectations regarding the mother's responsiveness may lag behind.[6] A final possibility is that the strange situation classification reflects a child's experience of the mother as responsive (or not) when the child is under stress, but not his or her experience of the mother under conditions of low stress. This certainly would be consistent with the nature of more mature relationships. We are unlikely to hold it against those we depend on if they snub us mildly in everyday life, as long as they are truly there for us when we feel we *really* need them. The inverse should also be true: We may dismiss, discount, or at least hesitate to put faith in the sensitive responsiveness of others if we still cannot forgive them for the times they failed or disappointed us.

Finally, questions may be asked about the validity of the expert (criterion) sorts themselves. AQS researchers have emphasized that the organization of secure-base relevant behaviors (i.e., the child's profile relative to the expert *Q*-sort of the security construct) is the best measure of security (Posada, Gao, et al., 1995). Experts may agree, and yet the criterion sort may still require some revision.[7] The validity of the criterion sort for 3-year-olds is especially problematic: At this time, there simply is not a sufficient descriptive base from which to derive a sound criterion. A general concern is that expert sorts may confound core attachment phenomena with other behaviors, which are correlated with attachment patterns under some circumstances but not others. For example, in some cultures the infant is very rarely out of proximity with the mother; distance communication (including affective sharing between mother and baby) is rare, as is the provision of toys or maternal involvement in cognitive stimulation (Ainsworth, 1967; Brazelton, 1977; Goldberg, 1977; Levine & Miller, 1990; M. True, personal communication, 1996). Within the infant criterion sort, however, some items reflecting these kinds of interactions are given great weight (i.e., have relatively extreme placement in the sort). The only way to determine

whether the current weighting of items is appropriate is to test and refine criterion sorts against strange situation classifications cross-culturally and with respect to extensive naturalistic observations.

SUMMARY AND CONCLUSIONS

Our overview of attachment security measures reveals a robust field in a period of active expansion and experimentation. In the last decade, several new measures have emerged as researchers have attempted to validate the original Ainsworth classification measure and to test and extend attachment theory past the second year of life. Many researchers have given attention to the basic requirements of construct validation as we have outlined them here. At the same time, it must be acknowledged that few have been entirely systematic or thorough in this regard. Not surprisingly, as the strange situation was developed nearly 30 years ago, the most complete information is available for it. Researchers who use other measures should be aware of the substantial gaps that remain in their validation.

In our view, the greatest uncertainty surrounds assessment of attachment security in the early preschool years (approximately 21 to 48 months). As discussed earlier, this period of development presents special challenges. The attachment system is not as easily activated in the preschool-age child as in the infant, and the behavioral repertoire exhibited by children in this age group is broader. In contrast to those of older children, the linguistic and representational capacities of preschoolers are still primitive and vary greatly between children and across situations. Thus both brief observational measures and representational measures appear to be less robust and less sensitive than might be expected. There is a tremendous need for long-term, naturalistic studies of attachment relationships in this theoretically critical age range.

The study of attachment security had its beginnings in Ainsworth's careful, ethologically influenced observations. These early studies, despite their reliance on small, homogeneous samples, provided a relatively sturdy base for a paradigm shift in the study of social and emotional development. Ainsworth's approach moved the field away from a trait-like view of infant dependency to one in which patterns of attachment were understood to reflect qualitative differences in the organization of the attachment and exploratory behavioral systems (Ainsworth, 1969). Similarly, Ainsworth's focus on maternal sensitivity definitively moved the field away from behaviorist and psychoanalytic approaches to the development of infant–parent bonds, and toward an emphasis on the contingent, reciprocal nature of mother–child interaction. Unfortunately, the explanatory appeal of the Ainsworth research paradigm and its predictive successes have engendered certain theoretical and methodological confusions or errors. We would like to comment on two of them here.

An error at the conceptual or theoretical level is a common, implicit assumption in the literature that secure child–mother attachment will in all contexts predict maternal sensitivity, positive affect on the part of the child, and harmonious interaction. In other words, attachment has come to stand for the whole of the multifaceted child–parent relationship (Hinde, 1982). One result of this thinking is that most researchers have given inadequate thought to the contexts in which they have observed parents and children. In contrast, we have emphasized throughout this chapter that attachment behavior is elicited by, and is best observed in, situations that are stressful, threatening, or fear-inducing for the child or that evoke those states in the child's memory. Assessments of the child–mother relationship in other contexts (e.g., play, problem solving) may yield measures that are correlated with attachment security measured under stressful circumstances, but are not equivalent to it. We have gone on to hypothesize that attachment security and insecurity are based primarily upon the infant's experiences with the caregiver in those moments in which the infant's attachment system is activated.

The other problem to which we draw attention is a methodological one that arises from the accelerated pace of research in attachment over the last decade. This acceleration seems to have been accompanied by a kind of frontier mentality regarding the development and use of new measures, at least by some investigators. In some ways this movement can be likened to a gold rush, and the prospect of discovering empirical "gold" may sometimes blind researchers to important validation issues. We especially caution researchers with regard to the following procedures, which have appeared in both published papers and conference presentations: (1) using measures developed for one age range (e.g., 24–48 months) in studies of earlier or later ages without prior, independent validation of the mea-

sure for the new period; (2) incorporating one or more procedures, measures, or coding systems into a new measure, and claiming validation for the new measure on the basis of data collected for the original procedures; (3) developing a coding or classification system for a new measure based only on *a priori*, theoretical considerations or only on findings with a theoretically similar measure, without refining these on the basis of empirical findings; (4) referring solely to the opinion of an "expert" by way of establishing reliability or validity for a new measure; and (5) asserting a new measure to be valid based on similarities in the distribution of classifications that emerge in the new system, compared to the distribution of classifications found with other measures or at other ages.

These procedures can be seen as creative shortcuts to the very real problems of measure development in the field. They are attractive because attachment research tends to require considerable training by experts, as well as lengthy, time-consuming, repeated, and hence expensive observations of subjects. Pressure within academia to publish quickly, ever more limited funding, and journal preferences all work against deliberation and caution in developing and validating new measures. It is a rare researcher who wishes to dedicate his or her career to validating existing measures. This enterprise is basic to the scientific endeavor, however, and should be taken as a collective responsibility within the field as a whole.

NOTES

1. It must be emphasized that the construct of security is meaningful only for a relationship in which a child has already developed an attachment to a particular caregiver. In situations in which this is in doubt, such as in studies involving transitions to foster care, the interpretation of any measure of security is problematic.

2. Because of space constraints, we rely for this review mainly on the published literature. This may have the unintended consequence of exaggerating rather than minimizing the appearance of a relation between any two variables, but it ensures that the studies have undergone peer review.

3. In evaluating the magnitude of intercoder stability or continuity figures, one should note that when classification groups are disproportionately represented in the sample, high overall concordance may mask poor concordance for one or several of the (less common) groups. This is a particular problem in attachment research, because secure classifications usually account for at least 50% of cases in normative samples. Indeed, several investigators have noted that high stability in classification is actually disproportionately due to stability (continuity) in the secure group, but not in the insecure groups (Belsky, Campbell, Cohn, & Moore, 1996; Solomon & George, 1996; van IJzendoorn, Juffer, & Duyvesteyn, 1995; Waters, Treboux, Crowell, Merrick, & Albersheim, 1995). It is recommended that researchers report kappa statistics, which are adjusted for the relative frequencies of categories, along with raw reliability/stability figures. A large discrepancy between the raw (unweighted) concordance statistic and kappa indicates that agreement, stability, and so on are unevenly distributed in the sample.

4. The interactive scales, along with measures of other aspects of infant behavior in the strange situation, have been used to derive two discriminant functions (broadly representing avoidance and resistance in the strange situation) (Richters, Waters, & Vaughn, 1988). These can be used to produce "classifications" with high correspondence to classification by trained judges. Only a few researchers have made use of this empirical approach to classification (see Ainsworth et al., 1978; Belsky et al., 1996). Individual differences in scores on these two functions could theoretically be used to provide more sensitive, dimensional data in attachment studies. The discriminant functions do not tap aspects of behavior relevant to attachment disorganization, however, and are therefore not appropriate for studies in which attachment disorganization is a focus of interest.

5. Easterbrooks et al. (1993) used the Main and Cassidy manual, but were trained on the Cassidy–Marvin system; Moss et al. (1996) relied entirely on the Cassidy–Marvin system.

6. A similar possibility is suggested by a review of the effects of clinical interventions on attachment classification (van IJzendoorn et al., 1995). Several studies reviewed by these investigators reported improvements in maternal sensitivity to a child without a concomitant move by the child to a secure classification.

7. According to data provided by Posada, Gao, et al. (1995), the expert sort seems to describe best the 3-year-old child of mature graduate student parents in Norway. Modal security scores in this sample were the highest of any of those studied.

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