THE MEASUREMENT OF ATTACHMENT SECURITY AND

RELATED CONSTRUCTS IN INFANCY AND EARLY 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 the 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 is an 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 what 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 the

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 (test-retest or 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).

Although this approach is well accepted, Nunnally (1978) 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 (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 control system (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 on 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 (e.g., crying, approaching, reaching, clinging). Once these goals 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 & 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) and not (entirely) a property of the child (i.e., not a function of temperament or some other quality).

Beginning with Ainsworth's pioneering work, which we describe more fully below, maternal responsiveness and accessibility typically is assessed through variables reflecting the mother's prompt and appropriate response to the infant's attachment signals, that is at the behavioral level. In the last ten to fifteen years, the field has shown increasing interest in the representational aspects of parental, especially maternal, sensitivity and to the maternal qualities that permit or support sensitivity. By extension, such variables ought to be related to attachment security in a similar fashion to behavioral sensitivity, and, in turn, can provide validity information for attachment measures. Although discussion of this broad array of variables is beyond the scope of this chapter, further information about them and their links to attachment measures are discussed in George and Solomon, Chapter 36, this volume, and Hesse, Chapter 25, this volume.

2. *Attachment security in a particular caregiver–child relationship should tend to remain stable over time (continuity).* Although Bowlby (1973, 1980) was well aware of destabilizing influences on infant–caregiver attachment (e.g., repeated separation, life stress) and avoided the doctrine of critical periods, he proposed that the quality of

attachment should become 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 is 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 stability 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 29, 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. In what follows, we briefly summarize the literature with respect to the

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construct validity criteria established earlier and refer readers to other chapters in this volume, as relevant. We begin with a lengthy discussion of reliability issues because the methodology departs substantially from what researchers in other areas of psychology may be familiar with, but touch on these matters more briefly when discussing other measures, later in the chapter.

Reliability

Intercoder agreement. The Ainsworth system and 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 (usually at least 80% or higher). 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 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 (Main & Weston, 1981; Waters, 1978). In the one published study that examined the important question of inter-laboratory 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 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, raises a question about 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, 1998; Lyons-Ruth, Repacholi, McLeod & Silva, 1991). When classification groups are disproportionately represented in a sample, high overall agreement (between judges or between classifications in stability assessments) 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 non-clinical 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, 1996; Waters et al., 2000). It is recommended that researchers report kappa statistics (K), 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.

Test-retest (short-term) stability. Ainsworth repeated assessments of the Strange

Situation over a very short term (i.e., 2 weeks) and found low stability of classification, presumably reflecting sensitization of infants to the separation procedure (Ainsworth et al., 1978). Ainsworth was especially struck with the collapse of avoidant strategies in the second assessment; a number of previously avoidant infants on retest showed behavior patterns that we might now classify as disorganized. Thus, where research designs require repeated testing (within or across caregivers), researchers should avoid close spacing of assessments. Separation of assessments of a month or more is recommended (Main & Cassidy, 1988; Main & Weston, 1981).

Relation to Other Measures of Security

One of the most compelling aspects of Ainsworth's original work was 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. 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). Studies using the AQS method have shown moderate relations between AQS security scores and attachment classification, with the clearest distinctions between the secure and disorganized groups (see the upcoming section on the AQS and van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004).

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 situations, although the associations have been weaker in the replications. In an important 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. Failure to replicate Ainsworth's original findings may reflect various kinds of measurement error—for example, reliance on limited samples of interaction 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 theoretically distinct constructs such as warmth, acceptance, and emotional

availability (Biringen et al., 2000; Bretherton, 2000; Seifer & Schiller, 1995). Recently,

some researchers have focused on components of maternal sensitivity such as sensitivity

to distress versus non-distress signals (Fish, 2001; McElwain & Booth-LaForce, 2006)

and contingency to affective signals (Völker et al., 1999). More refined analyses such as

these may contribute to an understanding of the aspects of maternal sensitivity most

relevant to promoting secure infant attachment.

The identification of the disorganized/disoriented category exerts 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. The alternate

classification may correspond to the level of maternal sensitivity, whereas

disorganization of the attachment strategy reflects other experiences with the mother.

Although no study of disorganized infants has approached the level of detail provided by

Ainsworth's original home study, researchers have identified two dimensions of maternal

behavior that are reliably linked to this classification—frightening or

frightened/dissociative behavior and various kinds of atypical, disrupted communication

(Hesse & Main, 2006; Solomon & George, 2006, in press). Additionally, a number of

investigators have reported links between attachment disorganization and child

characteristics such as gender and neurological vulnerability (Braungart-Rieker,

Garwood, Powers & Wang, 2001; Fish, 2001; Gervai, 2005). (For alternative views, see

Bakermans-Kranenburg and van IJzendoorn, 2004, and Lyons-Ruth and Jacobvitz,

Chapter 29, this volume)

The notion that attachment classifications reflect infant temperament or shared genetic inheritance between mother and child rather than the history of mother-child interaction and maternal sensitivity has a long and contentious place in the study of attachment. (See Vaughn, Bost, & van IJzendoorn, Chapter 9, this volume.) Here we note merely that a growing body of research indicates that temperamental and other biologically based characteristics influence the infant's emotional reactivity to separation and capacity to read maternal signals as well as challenge the mother's capacity to provide sensitive care (van IJzendoorn et al., 2007). Variation in infant security of attachment, however, especially that which is reflected in the standard Ainsworth A, B, C categories, is better explained by the history of mother-child interaction than by the direct effect of biological variables (Fearon et al., 2006; Fox, Susman, Feagans & Ray, 1992).

Continuity. Studies of long-term stability or continuity of classification can be separated into those that examine stability within the toddler period (12 to 18 or 24 months), within early childhood (between 12 and 60 months) or across several developmental transitions (i.e., from infancy to adolescence or early adulthood). (See Weinfield, Sroufe, Egeland, & Carlson, Chapter 4, and Thompson, Chapter 16, this volume for fuller discussions of stability.) Estimates of continuity depend on the validity of the measures involved, and, as we discuss later, this has been problematic for assessments after about age 20 months. Even without this difficulty, the empirical findings have been mixed. Findings of very high stability of classification (over 70%) have been reported across each of these time periods (e.g, Hamilton, 2000; Main & Cassidy, 1988; Waters, 1978; Waters et al., 2000). On the other hand, substantially less

stability of classification or non-significant levels have also been reported across all three

durations (e.g., Belsky et al., 1996; Cassidy, Berlin, & Belsky, 1990; Zimmermann et al.,

2000). 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 due to an increase in

numbers of disorganized/disoriented infants between 12 and 18 months (Lyons-Ruth,

Yellin, Melnick, & Atwood, 2003; Vondra et al., 2001). 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 Bakermans-Kranenburg (1999) estimated

stability of the D classification to be $r = .34$.

Researchers have been at great pains to explain low stability because this

construct is so central both to attachment theory and the validation of attachment

measures. Several investigators have demonstrated, however, that changes in

classification are systematically related to chronic or major shifts in maternal sensitivity

or family events such as loss, divorce, major illness, and poverty (on the negative side)

and marriage or new relationships (on the positive side). Thus, while findings of low

stability have been surprising, they currently are not seen as challenging the major

assumptions of attachment theory and perhaps should be given less weight overall in the

evaluation of the validation of measures.

Coherence. Inspired by Sroufe's (1979) early articulation of the coherence of

development across developmental tasks, the field has continued to generate a large body

of research on the links between early attachment security and later functioning with

parents, peers, in school, and in romantic relationships as well as psychopathology. It is

not possible to do justice to this literature here but the reader is referred to Thompson,

Chapter 16, and Weinfield et al., Chapter 4, of this volume. It should also be noted that Bowlby's seminal predictions about the links between early parent-child attachment and later psychopathology have mainly borne fruit in the study of the sequelae to disorganized attachment (summarized in Lyons-Ruth & Jacobvitz, Chapter 29, this volume; see also DeKlyen & Greenberg, Chapter xx, this volume). Evidence for links between the avoidant and resistant categories and later psychopathology are mixed, with clearest predictions from resistant classifications to anxiety disorders.

Cross-cultural predictions and predictions to other caregivers. Studies of infants from cultures beyond North America in the have mainly been limited to Western Europe, but researchers have also examined infants and their mothers in Israel, Japan, China, Indonesia, Puerto Rico, Mexico, and two sites in Africa (see van IJzendoorn & Sagi, Chapter 38, this volume). Although secure classifications appear to be normative (modal) cross-culturally cultural differences have emerged in the proportions of attachment groups, 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 suggest that differences in the distribution of the insecure classifications reflect systematic cultural differences in maternal sensitivity to infant signals. They may also reflect differences in the frequency with which infants in different cultures and subcultures experience even brief separations from their mothers.

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 (Cox, Owen, Henderson, & Margand (1992); Easterbrooks & Goldberg, 1984; Main & Weston, 1981; Schneider-Rosen & Rothbaum,

1990).   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). 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 as they do for infants and mothers. In addition, in a middle-class sample in which child-mother attachment was very stable over time, child-father attachment was not stable, with a net movement toward greater security (Main, Kaplan & Cassidy, 1985). 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 and in different contexts than do mothers (see Grossmann, Grossmann, Kindler, & Zimmerman, Chapter 37, this volume). Studies of fathers and infant attachment suggest that in comparison to mothers, fathers' behavior is more closely linked to marital conditions and infant temperament and gender (Belsky, 1996; Schoppe-Sullivan et al., 2006). This highlights 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 (see George & Solomon, Chapter 36, this volume, and Solomon & George, 2000). The manner in which these complex family relationships come to influence the security of the infant's attachment to the father remains unknown. Furthermore, the mechanisms by which infants arrive at qualitatively similar attachment strategies given large culture- and parent-related differences in patterns of interaction is also an area that needs further investigation.

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 simple way that predicts significant developmental outcomes years later (see Weinfield et al., Chapter 4, this volume).

Ainsworth's observational and coding skills remain unsurpassed. Indeed in a meta-analysis of over 65 studies, van IJzendoorn noted that the magnitudes of the associations between theoretically important variables reported by Ainsworth have yet to be matched by other researchers (De Wolff & van Ijzendoorn, 1997; van IJzendoorn et al., 2004). 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, as described above, a growing number of studies, using much larger samples, have revealed lower levels of stability of attachment between 12 and 18 months than was suggested by earlier, smaller studies (e.g., Waters, 1978). Mothers' work patterns, the degree of father's involvement in the lives of very young children and economic

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conditions also have changed considerably since early work was undertaken. Larger, more diverse and representative samples therefore us to revisit and perhaps revise earlier assumptions.

Certainly the most consequential addition to the original Ainsworth system, 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 behavior (Main & Solomon, 1990). Systematic research following on that original work has revealed the importance of this category for understanding variation at the more insecure and even clinical end of the spectrum. This body of studies strongly suggests that the explanatory power of Ainsworth's methodology is increased when this category is included in the study.

We would also like to draw attention to 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.

The interactive scales that form a part of the classification procedure, 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 (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 theoretically could be used to provide more sensitive, dimensional data in attachment studies. More recently, Fraley and Speiker (2003) tested the taxonomic structure of the standard Ainsworth categories using the interactive scales and analytic procedures first developed to test the single gene theory of schizophrenia (Meehl, 1973). They argued that a very large portion of the variance associated with the A-B-C classifications could be summarized by two dimensions broadly representing approach-avoidance and resistance-"emotional-confidence." Researchers interested in avoiding some of the well-known methodological pitfalls of categorical analysis could also make use of this approach to dimensional scaling. Neither of the above approaches taps aspects of behavior relevant to attachment disorganization, however, and in their present state of development these approaches are not appropriate for studies in which attachment disorganization is a focus of interest. We return to the question of categorical versus dimensional approaches, again, at the end of the chapter.

Finally, we call attention to the fact that 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 toddlerhood, the AQS, does not permit distinctions between the avoidant and resistant groups, it is still fair to conclude that construct validation for attachment

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classifications, technically, is not complete.   We hope that this rather unsettling

realization will inspire researchers to devise 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 Attachment Working Group (1987/1990/1991/1992) 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 reunion behavior.

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. There are strong similarities between Crittenden's Preschool Assessment of Attachment (PAA) system and the Cassidy–Marvin system, as well as subtle but 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 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. Manifestations of this latter pattern are termed controlling-caregiving in the Cassidy-Marvin and Main-Cassidy systems (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 slightly longer separations changes in the role and/or gender of the stranger, changes in the instructions to the caregiver, and blending with other laboratory tasks and procedures. A common approach in recent studies, and one that is recommended in the most recent manual (Cassidy & Marvin, 1987/1990/1991/1992) is to omit the stranger episodes entirely and thus leave the child alone in the room during both separations. Unfortunately, there has been no systematic determination of whether these variations materially affect the reunion behavior of the children.

A description of the categories used in all three systems is provided in Table 18.3. Although the Main and Cassidy system for 6-year-olds was developed earlier, we present information about the Cassidy–Marvin system first because it applies to chronologically younger children. We next consider the Main-Cassidy system. Crittenden's PAA system has been used by relatively few investigators in recent years. It is with reluctance that due to space limitations we do not include an updated section on its use and validity in the current edition. Interested readers are referred to the pertinent sections in the first edition of this handbook and to chapters by Crittenden and others in Crittenden and Claussen (2000).

The Cassidy, Marvin, and MacArthur Attachment Working Group Assessment of Attachment in Preschoolers

The Cassidy–Marvin system 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. As with the Strange Situation, classifications are based primarily on the child's behavior toward the mother during both reunions.

Reliability

Intercoder agreement. The majority of researchers using the Cassidy–Marvin system participated in the MacArthur Working Group on Attachment (a collection of attachment researchers who collaborated to create the system), reported being trained by Cassidy or Marvin, 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, e.g. 72%, but most report reliabilities of 85% or higher.

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

Relation to Other Measures of Attachment Security

In a recent meta-analysis of 137 published and unpublished studies (through 2004) involving the Attachment Q-sort (Waters & Deane, 1985), secure classification in the Cassidy-Marvin system was significantly related to preschoolers' attachment security in the home, but at a more modest level compared to findings for infants (combined $r =$ .26, for children 30 months or older, $r = .31$, for children ages 12-18 months) (van IJzendoorn et al., 2004). Since the meta-analysis, Posada (2006) reported no significant difference among attachment classification groups in either the overall AQS security or scales that tapped particular aspects of mother-child interaction in the home. Moss and

colleagues (Moss, Bureau, Cyr & Dubois-Comtois, 2006), however, found significant differences in AQS security overall among children classified according to the Cassidy-Marvin system. AQS scores differentiated inconsistently among the classification groups, with higher AQS security for children classified as secure compared to those classified as ambivalent or disorganized, but no reliable differences between the secure and avoidant or controlling groups. This partial correspondence (as well as the overall lower association between measures reported by van IJzendoorn et al., 2004) may be due to the fact that since attachment behavior is rarely elicited in the home at this age, only distinctions between preschoolers who are secure and those who are either highly dependent (and susceptible to exaggerated displays; Main, 1990) or without minimally adaptive attachment-related defenses (Solomon, George, & De Jong, 1995; Solomon & George, 1999) are readily apparent.

Two studies have shown links between Cassidy–Marvin classifications and a representational measure of attachment security (Bretherton et al., 1990a; Bretherton, Ridgeway & Cassidy, 1990b; Shouldice & Stevenson-Hinde, 1992). Preschoolers classified as secure, compared to those classified insecure, received higher scores for representational security, i.e., were judged more open to negative feelings and better able to tolerate attachment fears .

Prediction to Core Variables

Mother–child interaction. Detailed descriptive research on mother–child relationships in naturalistic situations paralleling Ainsworth's original studies in the home as related to infant classification has not yet been reported. In the first study of mother-child interaction in the home and laboratory as related to Cassidy-Marvin classifications

however, Stevenson-Hinde and Shouldice (1995) found predicted differences between the secure and insecure groups in measures of mothers' sensitivity, socialization, positive involvement, and scaffolding of tasks. Differences between the secure and the various insecure groups were revealed in one type of situation or the other, depending upon the group. 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. More recently, the NICHD Early Child Care Research Network (2001) reported a low but significant correlation between maternal sensitivity in the home and secure vs. insecure attachment classifications in their large, heterogeneous U.S. sample. Significant differences between attachment groups were restricted to the contrast between the disorganized and secure classifications. Studying a large French-Canadian sample, Moss and her colleagues (Humber & Moss, 2005; Moss et al., 2004a; Moss, Cyr & Dubois-Comtois, 2004b) found overall smoother and more positive interaction during a brief "snack-time" between mothers and secure 3 to 5 and 5- to 7-year-olds in comparison to dyads in which the children were judged insecure (NB, the Main-Cassidy system was used for classifications for children 6 years of age and older). The clearest differences in both age periods were between dyads with children judged disorganized/controlling and secure dyads. Indeed, the former were characterized by the poorest mother–child coordination, communication, and enjoyment of all groups. A distinct pattern of significant differences among mothers of secure, avoidant, and dependent children, overall or with respect to other descriptive scales, was not found at the older age. A somewhat clearer pattern emerged, however, in the younger age group,

with secure dyads superior to insecure ones and avoidant and dependent dyads superior to D-controlling dyads. In a sample of low-income African-American preschoolers, Barnett, Kidwell, and Leung (1998) reported that mothers of insecure (mainly avoidant) children were more likely than mothers of secure children to be rated as low in warmth and high in control. Britner, Marvin, and Pianta (2005) developed a classification system and rating scales to differentiate the behavior of mothers corresponding to the Cassidy-Marvin child attachment groups. In this system, the mother's behavior is classified on the basis of her behavior in the Strange Situation. Classification criteria reflect qualities captured from Ainsworth's original studies of mothers of infants and studies of adult attachment representation. Agreement between mother and child classifications was high, though not exact (K = .57), with many of the disagreements occurring in dyads with a disabled child. Though this system seems to provide strong evidence that distinctions exist in maternal behavior corresponding to all of the child classifications, the fact that mother and child categories are based on the same sample of behavior is problematic.

Studies in non-normative samples provide indirect evidence to suggest that classification reflects differences in maternal behavior. In a series of studies involving, variously, maltreated children, dyads with anxiety-disordered, depressed, adolescent, or impoverished mothers, or mothers who were unresolved with respect to the child's disability diagnosis, the children were less likely to be classified as secure and more likely to be classified into one of the "atypical" classifications (e.g., disorganized, controlling, or I/O) than comparison children (Barnett et al., 2006; Cicchetti & Barnett, 1991; Fish, 2004; Hoffman, Marvin, Cooper, & Powell, 2006; Lounds et al., 2005; Manassis et al., 1994; Marvin & Pianta, 1996; Toth, Rogosch, Manly, & Cicchetti, 2006).

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 the disorganized classification being the most common.

    Continuity. A number of studies have provided data on continuity of classification from toddlerhood. Two of the largest such studies (NICHD & Network, 2001; Seifer et al., 2004) reported significant but very low stability in classifications over time and two studies with somewhat smaller samples reported no significant stability over the early childhood period (Bar-Haim, Sutton, Fox, & Marvin, 2000; Fish, 2004). Significant but moderate continuity of classification (K = approximately .40) has been reported in others (Cassidy et al., 1990; Cicchetti & Barnett, 1991; Lounds et al., 2005; Shouldice & Stevenson-Hinde, 1992; Stevenson-Hinde & Shouldice, 1995). In these studies, the secure pattern shows the highest consistency over time (though the insecure pattern showing the most change differs from study to study). In other words, a substantial portion of insecure infants appear to become secure in the preschool period. (For an exception, see Rauh, Ziegenahin, Muller, & Wijroks, 2000). In the only study to date of stability of the Cassidy-Marvin classifications *within* the preschool period, Moss and colleagues (2005) found moderate stability (K =. 47) between 3.5 and 5.5 years in a sample that was heterogeneous with respect to SES (NB, the Main & Cassidy system was used for 6 year olds). Stability of group assignments was over 60% for all groups except the insecure-avoidant which shifted considerably (44% concordant). An interesting additional finding in this study is that 70% of disorganized preschoolers shifted into the controlling category within this time period, suggesting that this is point at which disorganized children develop their secondary controlling strategies.

The level of instability in classification might in itself raise questions about the validity of the Marvin-Cassidy system. Although lack of continuity of infant classification is more common in poverty samples in general (see Weinfield et al., Chapter 4, this volume) this distinction does not appear to be a key factor in the foregoing studies, which reflect the full range on this variable. Investigators in each of the above studies established, however, that shifts between the secure and insecure classification(s) were related to corresponding changes in mother-child interaction and/or other key factors such as marital distress and separation, losses, and other positive or negative life events that reasonably would be expected to have an impact on the mother-child relationship.

Coherence. A few studies report differences between secure and insecure children in other developmental domains. Secure children have been reported to be more cooperative with their mothers in brief laboratory tasks (Cassidy et al., 1990), less gender stereotyped (Turner, 1991) and less anxious (Shamir-Essakow, Ungerer, & Rapee, 2005). Fish (2004) found, however, in a rural, poverty sample, that infant security classifications but not preschool ones were linked to cognitive and social emotional competence, raising some question about the validity of the classifications for older children.

Differences in the level of behavior problems between secure and D/controlling classifications are consistent with findings at later ages. Based on teacher reports, secure children were less likely than disorganized children to show externalizing and internalizing behavioral problems (Moss et al., 2004b). In a clinical population, children classified as disorganized were more likely to be diagnosed with conduct disorders (Greenberg, Speltz, Deklyen, & Endriga, 1991; Speltz, Greenberg, & Deklyen, 1990).

Cross-cultural studies and other relationships. The Cassidy–Marvin system has been used to study attachment in the United States and England, Canada, and Romania. There is no published information on preschool attachment in countries or cultures other than these or on father–child relationships.

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 ranged from 70% to 88%.

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. The authors suggest that instability in part reflects sensitization to the

test situation.

Relation to Other Measures of Security

Main–Cassidy classifications have been shown to be related to secure versus insecure classifications based on three different procedures for classifying children's representations of attachments (Cassidy, 1988; Gloger-Tippelt, Gomille, Koenig, & Vetter, 2002; Solomon, George, & De Jong, 1995). Solomon and George's system has been shown to differentiate reliably among all of the ABCD groups in both a USA and Japanese sample (Kayoko, 2006). Concordance between Main–Cassidy classifications and ratings or classifications of children's responses to pictures of attachment- related events has also been reported (Jacobsen, Edelstein, & Hofmann, 1994; Jacobsen & Hofmann, 1997; Slough & Greenberg, 1990).

Prediction to Core Variables

Mother–child interaction. Solomon, George, and Silverman (1990) found significant correlations between ratings based on Main–Cassidy classifications 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. Based on her studies of a French-Canadian sample, Moss reported that mother-child interaction in secure dyads is more harmonious than within insecure dyads, with the lowest scores received by mothers of D controlling children of all sub-types (Humber & Moss, 2005; Moss et al., 1997; Moss et al., 1998).

Continuity. Main and Cassidy (1988) reported a very high stability (K = .76) between 12-month and 6-year A-B-C-D classifications with mothers. Wartner et al.

(1994) reported a similar level of stability over the same period in their independent German sample. As described previously, Moss recently demonstrated moderate continuity over a two year period between Marvin-Cassidy preschool classifications and Main & Cassidy classifications at age 6 (Moss et al., 2005).

Coherence. Cohn (1990) and Wartner et al. (1994) 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). Insecure classification, especially the D-controlling group, has been linked to behavioral problems in high and low risk samples (Easterbrooks, Biesecker, & Lyons-Ruth, 2000; Easterbrooks, Davidson, & Chazan, 1993; Solomon et al., 1995). Paralleling these findings, at the representational level of assessment, Cassidy, Kirsh, Scolton, & Parke (1996; study 2) found that secure children had more positive representations of peers' intentions and feelings, as assessed from social problem-solving vignettes, than did insecure children. 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). More recently, Bureau (Bureau, Býliveau, Moss, & Lýpine, 2006) found that 6-year-old D controlling children depicted more themes of conflict in response to the Bretherton (Bretherton et al., 1990a) stories and that secure children produced more discipline themes than avoidant children and displayed higher coherence than the dependent children.

Cross-cultural studies. The Main–Cassidy system has been used in the United States, Canada, Iceland, Germany, Italy, Australia, and Japan.

Discussion

Based on widespread use and, correlatively, the state of validation overall, the Cassidy–Marvin system must now be considered the preferred measure for assessment of attachment of three- and four-year-olds and the Main-Cassidy system the preferred measure for five- to seven year-olds, especially for researchers who are interested in differences among the four classification groups. Both measures have been investigated with respect to all of the validation criteria described earlier and appear to be related both to other relationship measures and to the core variables in ways that broadly parallel research on infant classifications. The Main-Cassidy system appears to function as it was intended, yielding coherent and predicted differences not only between the secure and insecure groups but among the A-B-C-D groups as well. It should be borne in mind however, that it has been employed in relatively few studies and mainly with normative, middle-class samples. Extending its application to high risk or more recent cohorts might yield more complex results.

The validation results for the Marvin-Cassidy system, indeed, are more complex, and at this time, it is not clear why. The key problematic findings, repeated across a variety of samples and investigators, are (1) relatively low continuity between infant and preschool-age classifications, usually attributable to a shift from the insecure groups (usually A, sometimes C) to the secure group, and, (2) failure consistently to find distinctive differences in mother-child interaction associated with the avoidant and ambivalent groups. Clear distinctions usually emerge between children classified as

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secure and those classified as disorganized or controlling. (Note that in most samples, the numbers of children in the insecure groups (A, C, or D) though relatively small, are usually comparable.)

It may indeed be the case that some attachments undergo major change between the third and fifth years of life, reflecting expectable shifts in parent-child relationships. Below we discuss some reasons for this; these same arguments may also apply to consideration of AQS validity, which we discuss later in the chapter. The period from infancy to preschool is one of considerable change in the child's capacity for language, goal-corrected behavior, and self-control. Parental expectations, the child's role in the family, and family life in general might shift considerably in this period as a consequence. If so, instability in classification may be a poor marker of the validity of the measure in this age range.

The failure to find strong differences in mother-child interaction also may reflect developmental shifts in relationships. As children become more mature and fewer situations activate the attachment system, some mothers may become better able to cope with their children's needs, leading to actual improvements both in their mutual perception of their relationship and their interaction. It is also possible that researchers have simply chosen less differentiating contexts in which to observe interaction. The most salient issue for preschool parent-child dyads is the development of self-control and socialization. Indeed, the studies that have shown the clearest differences in mother-child interaction associated with Cassidy-Marvin classifications have focused on interaction in "clean-up" tasks (Achermann, Dinneen, & Stevenson-Hinde, 1991; Crittenden & Claussen, 1994; 2002).

Low stability might also reflect various kinds of measurement error. The procedure may not be sufficiently stressful to reliably activate the attachment system of some preschoolers. This might result in false positives for the secure group for children who are (or were) avoidant; some secure children might also be misclassified as avoidant if they are a bit "too casual" in the procedure. This interpretation is supported by a recent study by Oosterman and Schuengel (2007), which found that for preschoolers, brief laboratory separations from the parent were insufficient to activate the sympathetic nervous system even if children were insecure or temperamentally inhibited.

Somewhat disconcertingly, just how distressing a child will find the separation may be a function of his particular "underlying" attachment strategy (ambivalent/dependent or disorganized children might be most susceptible). The protocol advises encouraging parents to give reasons for their departure and be prepared to "negotiate". This is developmentally appropriate and yet quite different from the instructions given to parents of infants. It reflects the fact that some preschoolers can be more disturbed by the parent's departure from expectation than by the parent's *actual* departure. Thus, maladroitly handled separations or other unusual features of parental behavior might have unexpectedly large consequences for preschoolers. From the perspective of evaluating stability from infancy or other important variables, then, short-separation procedures might provide a more "accurate" picture of the state of some relationships than others. Research should focus systematically on optimal separation times and observation contexts for this age, perhaps also adding physiological measures, in order that procedural variables neither create nor mask what may be very interesting new findings about the development of mother-child attachments.

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, Grossmann, Grossmann, & Waters, 2005). 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, 2005; Main et al., 1985). Recently, researchers have emphasized the script-like nature of what is encoded as part of repeated experiences within a relationship (Waters & Waters, 2006). Because of their link to experience, individual differences in representational 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/or secure-base behavior in early childhood and thereafter. (The reader is referred to Bretherton & Munholland, Chapter 5, this volume, for a full discussion of internal representational models in children and adults).

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. There is not a complete body of validation information for any of the measures developed to date. Below, we describe what is known about the most influential of measures, omitting several others, unfortunately, due to space limitations.

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, 1987; Slough & Greenberg, 1990) incorporate the procedures of the SAT (Separation Anxiety Test), 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. The coding schemes are mainly dependent on children's verbal responses as the basis for inferring representational models. 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 classifications was 68% for the four groups (K = .55). Kaplan's coding system has been used in a handful of additional studies. SAT responses were significantly related to ratings of the ease of access to self-evaluations of 8-year olds as well as to behavior problems at home and school (Easterbrooks & Abeles, 2000). Ackerman and Dozier (2005) found that ratings of adaptive coping responses to the SAT, but not emotional security (openness) were related to foster mothers' acceptance of the child and children's self-esteem (assessed with the "Puppet Interview" (Cassidy, 1988). Clarke and colleagues (2002), using the SAT among

other representational measures, found that 5- to 10-year-old boys diagnosed with ADHD gave responses most consistent with ambivalent or disorganized classifications.

Jacobsen and her colleagues (Jacobsen et al., 1994; Jacobsen & Hofmann, 1997) 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. The Icelandic children were 7 years old when assessed. Judges were trained by Kaplan and established excellent within-laboratory agreement ($K = .80–.87$). Stability over the following year was substantial ($K = .78$), and concordance with both infant classifications and concurrent reunion classifications based on the Main and Cassidy system was equally high. Secure versus insecure representational classification (especially the D pattern) successfully predicted several theoretically related variables for children between the ages of 7 and 15, including performance on cognitive-developmental tasks, self-esteem, teacher-reported attention and participation in class, insecurity about self, and grade point average..

Slough and Greenberg (1990) used the SAT pictures and developed four scales, apparently adapted from Kaplan's early classification criteria, 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 this nonstandard separation–reunion procedure, the interpretation of these findings is open to

question. No information is available regarding inter-coder reliability or test–retest stability of the Slough and Greenberg measure.

Doll Play

A second approach to developing representational attachment security measures is founded on observation of children's doll play centering on attachment-relevant themes. There have been many different, yet overlapping, protocols developed as well as major variants in approaches to classification and rating.   Here we focus on three systems-- the Bretherton doll-play procedure (Attachment Story Completion Task, ASCT; Bretherton, Ridgeway, & Cassidy, 1990b), Cassidy's (1988) "Incomplete Stories with Doll Family," and the Attachment Doll Play Assessment (ADPA; George & Solomon, 1990/1996/2000). The Bretherton et al. doll-play procedure was originally designed to assess attachment security in 4-year-olds. This procedure involves a set of five stories, only the last four of which are involved in rating and classification (child spills juice, child hurts her knee, child "discovers" a monster in the bedroom, parents depart, and parents return). The Bretherton stories are a subset of the Macarthur Story Stem Battery, a group of 10 stories reflecting a variety of parent-child interactions, which were developed in collaboration between Bretherton and other members of the Macarthur team (Bretherton, Oppenheim, Buchsbaum, Emde, & the MacArthur Narrative Group, 1990). In Bretherton's procedure, an adult introduces each story with a story stem that describes what has happened, and a child is asked to 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. The system was designed with the goal of detecting parallels between the action described by the child and what might be expected of children in each of the Ainsworth groups based on what is known about their reunion behavior, what might be inferred from the various insecure attachment strategies, and Kaplan's early descriptions of SAT responses. Secure (B) children demonstrate coping behavior in relation to the attachment themes. 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 are 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 (A, C, D) 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 47 months. Representation security scores also 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.

Cassidy (1988) also created a set of six stories (e.g., the child gives the parent a present; the child does not like what is served for dinner; the child is awakened by a large noise) for use with kindergarteners and devised a rating and classification scheme intended to differentiate among the secure and two of the insecure classifications (A, B, D). High scores and the secure classification reflected qualitative judgments that the relationship depicted between mother and child was open, warm, and trusting and the protagonist as valuable and worthy. Average inter-rater reliability on both measures was above 85% and test-retest stability (one story only) was .63 on the scale and 73% on story classification. The security scale showed a moderate, positive correlation with children's reunion security scores and reunion attachment classifications were also significantly, but moderately, associated with representational classifications. The closest correspondence between reunion and doll play classifications appeared to be for the secure and D-controlling reunion groups, with most of the controlling children depicting quite negative mother-child interactions in doll play. Verschueren, Marcoen, and Schoefs (1996), using a combination of stories from Bretherton et al. and Cassidy, applied Cassidy's rating and classification scheme to the doll play of Belgian kindergarteners in order to explore children's self-representations and social competence and success. They reported levels of inter-rater agreement similar to Cassidy's and found moderate, positive associations between both the Cassidy security score and classification scheme with representations of the self. Children also completed a second doll play assessment with a father rather than a mother doll. Mother and father stories tended to be rated and classified similarly and security scores from father assessments were positively associated with teacher ratings of

social competence, anxious/withdrawn behavior, and school adjustment (Verschueren & Marcoens, 1999).

George and Solomon (1990/1996/2000; Solomon & George, 2002; Solomon et al., 1995) developed an alternative approach to deriving classifications based on doll-play responses to the ASCT (Bretherton) story stems that has been quite successful in differentiating among Main-Cassidy reunion classification groups. We introduced some changes to the Bretherton et al. procedures to facilitate symbolic play and enhance involvement. The system identifies four attachment groups. In our initial version of the system, we differentiated responses to the combined separation-reunion stories on the basis of narrative structure as well as content, resulting in four group descriptively termed "confident" (B), "casual" (A), "busy" (C), and "frightened" (D).

Subsequently we reworked our classification scheme (Solomon & George, 2002) in light of our further examination of children's separation-reunion narratives, our research with maternal caregiving interviews (George & Solomon, 1996; Solomon & George, 1996; 1999a), and the Adult Attachment Projective (George, West, Hilsenroth, & Segal, 2004). The organizing framework is derived from Bowlby's (1973, 1980) articulation of the defensive processes related to separation and loss (George & West, 1999; Solomon & George, 1999b). To summarize briefly, although security can be expected to reflect a flexible integration of attachment-related thoughts and feelings, strategies of defensive exclusion of information can be systematically brought into play as responses to anxiety and fear regarding attachment figures. These processes include deactivation (circumvention of attachment related thoughts and feelings) and cognitive disconnection (disconnection from awareness of the links between affect and thought).

When attachment-related distress cannot be contained (assuaged), dysregulation of the attachment system (or in Bowlby's terms "segregated systems") is likely to be the result. Uncontained frightening and catastrophic events as well as persistent constriction (refusal to play) are seen as evidence of dysregulation. The updated coding system, which is applied to the separation-reunion stories and two others reflect this theoretical underpinning. Criteria for the A-B-C-D classification groups are based on features of story content and structure reflecting these processes, with indices of flexible integration corresponding to secure patterns, indices of deactivation corresponding to avoidant patterns, indices of cognitive disconnection corresponding to ambivalent patterns, and indices of dysregulation corresponding to disorganized/controlling and unclassifiable patterns.

A supplementary coding system that captures specific markers for disorganization in the stories and in the child's behavior toward the story administrator is also available. Markers of one or another defensive process can be subtle. For example, in the "Monster in the Bedroom" story, where the child calls out to the parent in the night, having the parents give the child a rational explanation such as "Don't worry, that's just your teddy bear on the chair" would be a marker of deactivating processes. Having the parents say something such as, "Don't worry, it's just a dream," would be taken as a marker of cognitive disconnection, the hallmark of which is a state of uncertainty: It neither provides a satisfying solution nor a rational explanation but rather leaves the child with a vague feeling of unease that cannot be definitely addressed. Both the original and the revised systems were tested on a sample of 52 middle-class kindergarteners, ages 5 to 7. Coders are required to reach 85% agreement. The concordance between the revised

representation classifications and attachment classifications based on reunion behavior (Main & Cassidy, 1988) was 79% (K = .70), which is just slightly higher than what was achieved with the original classification procedure.

Three investigators have published applications of this updated system to high-risk populations. Venet, Bureau, Gosselin, and Capuano (2007) found that neglected children were more likely to be classified in the avoidant (deactivating) representational group and were likely to receive high scores on indices of disorganization. Katsurada (2007) found that the disorganized (dysregulated) representation group was most common among Japanese children in group foster care, and that no children were judged secure (flexible). Webster (in press) found no secure attachments in her sample of clinically referred maltreated children, but found that the presence of indices of security was negatively correlated with parent and teacher ratings of aggression and conduct disorder.

Family Drawing Measure

Several investigators have presented preliminary findings for another promising approach to representational security based on family drawing. 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 modifications of it) and reunion behavior classifications (Fury, Carlson, & Sroufe, 1997; Main et al., 1985); however, this finding has not been replicated in all studies (Main, personal communication, 1998). Clarke (2002) reported links between picture drawing classifications, SAT, and Cassidy Puppet Interview classifications (designed to tap self-esteem) (2007) for a small group of boys

with ADHD.

Discussion

A review of the available literature on measures of young children's representations of attachment reveals a wealth of efforts to capture variation related to security. Although validation of these measures is incomplete, 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 continue to 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 (2000) 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 interaction-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.

Much of the research on children's internal representation of attachment was

inspired by work in Main's laboratory in the mid-1980's, which led to the development of the Adult Attachment Interview (George, Kaplan, & Main, 1984, 1985, 1996), Kaplan's first attempts to capture representational processes in the drawing and SAT responses of kindergarteners (Kaplan, 1987), and Cassidy's self-esteem and family stories (Cassidy, 1988). Many more investigators than we have summarized here have attempted to study children's symbolic representation, leading to an almost dizzying array of instruments from which to choose. This collective effort has resulted overall in the demonstration of direct analogues to well-established qualitative differences in parent–infant and parent–child interaction, as well as to representational processes already identified in secure 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 representational security in several systems 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, 2000).

Despite these strengths, several systems have failed to differentiate completely differentiate among the various insecure representations. In our view, this is because they have focused too broadly on the surface content of children's narratives rather than detecting age-specific manifestations of defensive processes. This is clearest, perhaps,

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with respect to the avoidant group. One of the key features of the dismissing (Ds) group on the AAI, linked empirically as well as theoretically to avoidant infant attachment (Main et al., 1985; van IJzendoorn et al., 1995) is the adult's tendency to idealize the self and others (see also Cassidy & Kobak, 1988). Idealization is also shown in Cassidy's (1988) study of responses to representations of the self in a "Puppet Interview," where avoidant children are most likely to describe themselves as "perfect." Verscheuren's et al.'s (1996) analyses of children's representations of the family in doll play indicate that many of the children classified as "secure" in the Cassidy system also describe themselves as "perfect" in the Puppet Interview. This suggests that the attachment classification criteria, fail to differentiate evidence of real confidence in the relationship from defensively asserted (portrayed) confidence, which is most likely to be shown by children with avoidant (or as we have termed it, deactivating) defenses.

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 relying 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 caregiving children. Transfer of Kaplan's picture-based system to doll-play materials may be one reason why, several doll play based systems have failed to distinguish among insecure classification groups. Verbal responses to pictures and doll play may well draw

on different memory processes (e.g., explicit versus implicit memory). Second,

researchers should also consider the degree to which representational procedures activate

the attachment system; this may differ depending on the age of the child being tested. 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. These differences may reflect an interaction between

the attachment system and cognitive development (e.g., differences between

preoperational and concrete operational information processing).

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, Waters, Crowell, & Lay, 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 associated 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 are not available, although some researchers have developed classifications on *a priori* grounds for particular purposes (e.g., Howes & Hamilton, 1992; Kirkland et al., 2004).

van IJzendoorn and colleagues (2004) recently undertook a meta-analysis of 139 AQS studies (13,835 children ages 12–70 months) for the purpose of establishing the validity of this measure that was based on the same conceptual approach developed here. Below, for summary purposes, we rely on their findings and refer to specific studies in this area when specific points require a more fine-grained approach.

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 inter-observer reliability (correlations between sorts) ranging from .72 to .95. The correlation between mothers' and trained observers' sorts tends to be moderate in small to medium-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 data, representing repeated sorts in close succession, are not reported in the literature.

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. Average Q-security scores for the secure group in the Strange Situation tend to be about .50, and average security scores for the insecure groups tend to be about .25 (Waters & Deane, 1985). van IJzendoorn et al.(2004) found a combined effect size of $r =$ .23, indicating a moderate association between the measures. They note that the correlation for observer-generated sorts was significantly higher than caregiver-generated ones, and conclude that there are substantial problems with Q-sort data generated by caregivers. Paralleling Ainsworth's original finding that insecure groups were difficult to distinguish based on their behavior in the home, distinctive differences between 12- to

18-month-olds classified as A or C in the Strange Situation do not emerge clearly in the AQS data. It appears to be the case, however, that infants classified as disorganized in the Strange Situation are characterized by very low AQS scores.

In the preschool period, the relation between the AQS and other security measures is less certain. van IJzendoorn et al.'s meta-analysis revealed significantly lower correlations between reunion-based attachment measures for preschoolers and observer-generated AQS security than for younger children. The weaker relation may be accounted for at least in part by the relative paucity of validity studies existing for this age range and the failure to explore effects of the disorganized classifications (see also Posada, 2006). Moss, Bureau, Cyr, and Dubois-Comtois (2006), in an effort to address these gaps, compared Cassidy-Marvin classifications to AQS security (trained mothers completed the sorts) in a middle-class French Canadian sample of preschoolers. They found the two measures to be significantly associated overall; the secure group was differentiated in AQS security from the disorganized and ambivalent classifications but not from avoidant and D-controlling ones. Somewhat more consistent links have been shown between AQS security in preschool and child representational measures of attachment. 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. Waters, Rodrigues, and Ridgeway (1998), using a script-analysis approach on the Bretherton data set at 37 months, were also able to show a positive correlation to AQS security. However, Oppenheim (1997) did not find a significant relationship between AQS security and his doll play measure of attachment.

Prediction to Core Variables

Mother–child interaction. Across both the infancy and preschool periods, scores or ratings of maternal sensitivity based on brief home visits were significantly related to AQS security. Meta-analysis also revealed that this relation was significantly higher for observer-generated sorts than for mother-generated ones. In contrast to what has been found for Strange Situation classifications, assessments of temperament, especially negative reactivity, show moderate correlations with AQS security. However, van IJzendoorn et al. reported that observer-generated sorts are significantly more independent of temperament measures than caregiver- generated ones (see also Vaughn, Bost, & van IJzendoorn, Chapter 9, this volume). In what may be a related set of findings, several studies report moderate concordance between mothers' and fathers' AQS security scores, which might also reflect the effect of temperament, among other factors (Bakermans-Kranenburg, van IJzendoorn, Bokhorst, & Schuengel, 2004; Caldera, 2004). Taken together, these findings suggest some limitation in the discriminant validity of AQS security, although the shared variance is not great. van IJzendoorn et al. (2004), found no relation between security with father and AQS scores or between paternal sensitivity and AQS security. Since there is also a great deal of question about the meaning of father-infant security as assessed in the Strange Situation, the lack of relation between measures in the case of fathers is not surprising.

Continuity. Continuity of AQS scores appears to be low to moderate over a period of two or more years, similar to what has been found for the preschool age reunion-based assessments. Using caregiver sorts Belsky & Rovine (1990) reported low to moderate long-term stability between ages 1 and 3 (mothers: $r = .23$; fathers: $r = .53$; social

desirability partialed out). Teti et al. (1996), who trained mothers thoroughly on the sorting procedure, reported correlations between (approximately) .40 and .60 two or more years later, after the birth of a sibling. Observer-generated reports appear to be variable, but potentially of comparable strength: van IJzendoorn et al. (2004) report that the combined stability correlation was .28. Clark and Symons (Clark & Symons, 2000) found a moderate, significant positive correlation in AQS security between ages two and (approximately) five based on observer sorts. (See also Bretherton et al., 1990.)

    Coherence. Using a sample of 33 studies, van IJzendoorn et al. (2004) found AQS security to be significantly related to measures of social competence with peers and siblings and with fewer child problem behaviors, although the correlations tended to be small. In contrast to the meta-analytic findings regarding parent and child behavior in the home, observer sorts were not superior to those of caregivers (parents or teachers). A variety of parental and marital variables (e.g., marital quality, social support, parenting stress, SES) have also been shown to be related to AQS security (Howes & Markman, 1989; Moss et al., 2006; Nakagawa, Teti, & Lamb, 1992).

    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) (Strayer, Verissimo, Vaughn, & Howes, 1995; Vaughn et al., 1991). This suggests that ecological factors may have a powerful effect on the patterning of young children's secure-base behavior in the

home. Recently, studies bearing on the validity of the AQS have been reported for samples from Thailand (Chaimongkol & Flick, 2006), Portugal (Vaughn et al., 2007), and South Africa (Minde, Minde, & Vogel, 2006).

Discussion

The great promise of the AQS lies in its emphasis on naturalistic observation in ecologically valid contexts. Researchers have demonstrated that the procedure can be used reliably and with adequate validity across a variety of national and cultural groups. As a practical matter, this measurement approach permits researchers to estimate attachment security without the laboratory space and equipment or extensive training required for the Strange Situation procedure. For the infancy period (ages 12 to 18 months) there is now a substantial literature demonstrating the validity of the AQS according to the criteria we established earlier. AQS security shows a reliable correspondence to security or insecurity in the Strange Situation as well as to maternal sensitivity. Thus, there is reason to be confident that the AQS taps a significant portion 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. The AQS procedure also does not allow reliable distinctions to be made among the insecure groups, although, as would be predicted theoretically, infants and children classified as insecure-disorganized are characterized by the lowest security scores.

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 is helpful to explore the sources of non-convergence in order to better estimate and understand the underlying construct of security. A besetting question for this method has been whether mothers or

trained observers are the more appropriate sources of secure-base data. Based on meta-analytic findings, van IJzendoorn et al. (2004) stated definitively that observer sorts are reliable while caregiver (self-) reports are not. Indeed, there is empirical evidence that the same maternal information-processing biases that are believed to be causal factors in the development of the different types of attachment relationships come into play when mothers complete their sorts (Cassidy & Kobak, 1988; Main, 2000; Solomon & George, 1999b; Stevenson-Hinde & Shouldice, 1995). (See also George & Solomon, 1996, and Chapter 36, this volume.) Observers, on the other hand, may be susceptible to different sorts of bias or error. 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 Waters' and Deane's (1985) original *Q*-sort study 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 (see also Moss et al., 2006). Thus, either caregivers or outside observers can provide reliable sorts under the proper conditions.

In our view, the most important limitation of the Q-data (which unfortunately is also its most important advantage) is that the AQS and Strange Situation classifications are rooted in the different contexts of the home and of the laboratory. In the placid and relatively safe environment of the middle-class home, there is little to activate the attachment system. That is why AQS researchers have emphasized their instrument as a measure of "secure base" behavior as opposed to attachment behavior in "emergency" situations, which the Strange Situation is. Of course, observers see many kinds of

behaviors in the home, many of which pertain to other behavioral systems than exploration or attachment. A consequence of this difference is not only that different behaviors are likely to be observed in the home as compared to the laboratory playroom, but that a certain amount of mother-child interaction 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 when the child is in real need of her (or him). 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. 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 (as assessed in the Strange Situation) may lag behind. A final possibility is that the young child's attachment working model of the relationship is more heavily influenced by some experiences than

others. This 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.[3]

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.[4] The validity of the criterion sort for 3-year-olds is especially problematic: It continues to be true that there 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 (e.g.,Carlson & Harwood (2003). The only way to determine whether the current weighting of items is appropriate is to continue to test and refine the criterion sorts themselves against classifications and other attachment measures cross-culturally.

SUMMARY AND CONCLUSIONS

In the first edition of the *Handbook of Attachment* (1999) we described attachment research as "a robust field in a period of active expansion and experimentation." Our current overview of attachment security measures shows the field to be at a mature stage, with several reasonably well-validated measures available which

are appropriate for children across the span of early childhood. Over time, many researchers have given attention to the basic requirements of construct validation which we outlined at the beginning of this chapter. There continue to be important questions, especially regarding attachment classification procedures in the preschool years, the most useful approaches to studying representational processes, and the meaning of a measure such as the Attachment Q-sort, which is based on unstructured home observations. As we have discussed throughout the chapter, however, these may reflect outstanding nomothetic, as much as purely measurement, issues. Looking to the future, we would like to consider two areas in which major change, both in practice and understanding, seems likely.

The first issue concerns the reliance on a categorical as opposed to a dimensional approach to capturing individual differences. It is well known that Ainsworth was committed to the investigation of behavioral constellations or multi-dimensional patterns (Ainsworth & Marvin, 1995) though she apparently was not averse to scaling based on a discriminant analysis of group differences (Ainsworth et al., 1978). Fraley and Spieker's (2003) contention that the A-B-C categories could be summarized more parsimoniously and accurately in terms of two dimensions, approach-avoidance and emotional confidence (distress and resistance), brought this matter to the fore once again. Fraley and Spieker argued from their findings that "it is difficult to justify the sole use of categorical models in attachment" (p. 402), a statement that has provoked one of the liveliest debates that the field has seen in some time (Cassidy, 2003; Cummings, 2003; Waters & Beauchaine, 2003). In rejoinders, commentators pointed out, as we have done here, that the classification approach has yielded great riches by training researchers to approach

the study of relationships from the perspective of organizational and strategic differences among attachment patterns or types (Cassidy, 2003). On the other hand, there is general agreement that security scales, such as that generated for AQS scores or the emotional security scale proposed by Cummings (2003) are entirely appropriate ways of representing and simplifying individual differences in relationships.

Fraley and Spieker's article shone a much-needed spot-light on the tendency to reify attachment classifications while forgetting the underlying constructs they were meant to tap. As Waters and Beauchaine (2003) pointed out, the existence of classification categories implies that there are testable mechanisms that underlie true categorical or taxonomic distinctions. Currently, there is no evidence regarding such mechanisms. Yet, the tendency to perceive and create categories to reduce a complex multidimensional reality is a pervasive, human tendency. It is intriguing to consider that infants and children, like adults, might also have a bias toward simplifying experiences with a caregiver which might lead them, in essence, to differentiate "good enough" from "not good enough" security in a more or less categorical manner.

We suggested earlier that some experiences with parents may weigh more heavily than others in the infant or child's unconscious assessment of a relationship as basically secure ("good enough"). This proposition could lead to some testable hypotheses. For example, Do infants, for example, "calculate" the ratio of accepted versus rejected bids for contact, in general, or predominantly when they are distressed (McElwain & Booth-LaForce, 2006)? Do they weigh more distressing or more recent experiences more heavily than others? Certainly, this "calculus," if there can be said to be one, must change over the course of development as a function of social, regulatory, and cognitive

development. These are fascinating issues that we hope might be addressed in future. In terms of measurement, however, there is no question that dimensional measures both of security and the defensive processes that underlie patterns of attachment are more efficient to generate and statistically more flexible. Among other advantages, it is likely that the divergent estimates of relationship stability that we have highlighted throughout this chapter might converge more closely with their use, since the category system introduces a certain amount of arbitrariness regarding cut-offs for group placement. It seems often to be the fate of mature sciences that rich and complex measures become simplified as the constructs they were meant to capture become assimilated beyond their original fields. We would not be surprised, though perhaps somewhat saddened, to see the research emphasis on attachment categories fade considerably in the coming years.

The second issue concerns the assessment of attachment for children who have or are continuing to experience deprivation of attachment figures, disrupted attachments, and major or frequent separations. These are the children of original great interest to Bowlby and those other researchers who contributed to our basic knowledge in this area. It is also a population of growing interest to attachment researchers (see Dozier & Rutter, Chapter 31, this volume, and B. Feeny, Chapter 40, this volume), and one that increasingly contributes to the caseloads of infant mental health and other clinical psychologists, many of whom use (or would like to use) conventional attachment measures as part of their assessments. The measurement problems in this context are two-fold, requiring a new look at standard measures and the development of new, ecologically valid ones. There has long been both an implicit and explicit understanding in attachment research that the interpretation of separation-reunion procedures is questionable when it

is uncertain whether the child has developed an attachment to the particular caregiver or when the child has recently undergone a major separation. It is also a consistent finding in studies involving such children, that when seen in separation-reunion contexts, the children are judged to be disorganized or unclassifiable in attachment (e.g., Jacobsen & Haight, in press; Zeanah, Smyke, Koga, & Carlson, 2005). The meaning of this disorganized attachment behavior cannot be assumed to be the same as it is for normative, home-reared children. It might reflect failure to establish attachments, separations, neurological perturbations or interactive experiences. Furthermore, the type or manifestation of behavioral disorganization might differ as well. Careful observation might reveal behavioral variants that reflect these different factors. In short, what seems to be called for is a re-examination of the separation-reunion behavior of these children akin to what was involved originally in detecting disorganization of attachment (Main & Solomon, 1986, 1990) as well as the development of new, ecologically valid measures. An example of this kind of methodology is described in Solomon and George (1999), where we found that formerly disorganized and "unclassifiable" toddlers experiencing overnight visitation with father in divorcing families were more likely to break down in anger toward their mothers during a clean-up task, some minutes *after* a second laboratory separation. Further investigation is yet needed to determine whether the original "unclassifiability" (which commonly looked like a breakdown of avoidance into a display of anger) and the later breakdown were actually a function of adverse separation-reunion experiences or of other factors.

This leads to our second point about attachment research in separation-related and other clinical contexts. The more clinicians incorporate attachment theory and research

into their work, the more need they have for convenient, non-laboratory based attachment measures. Many investigators undoubtedly hoped that the AQS could provide security data about as easily and inexpensively as conventional self-report instruments. Now that it is clear that caregivers need thorough training and observers need considerable observation time to create valid sorts, this hope has been somewhat diminished. Although clinicians may find that short-cuts such as using a one-separation procedure are adequate to their clinical needs (e.g., Hoffman et al., 2006) this procedure is less satisfactory when clinicians must contribute to legal proceedings involving the children or wish to participate in research. Researchers working in this area have already been very creative in devising alternative measures of attachment and attempting to validate them (Dozier, Stoval, Albus, & Bates, 2001; Poehlmann, 2005; Zeanah et al., 2005). We look forward to seeing more such measures, meticulously validated, of course, in the future.

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 journal 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. 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.

4. 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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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.*

TABLE 14.2. Strange Situation Classification Groups

Group Brief description

Secure (B) Uses mother as secure base for exploration. Separation: Signs of missing

(Ainsworth et al., 1978) 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) Explores readily, little display of affect or secure-base behavior.

Separation:

(Ainsworth et al., 1978) 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) Visibly distressed upon entering room, often fretful or

passive; fails to

(Ainsworth et al., 1978) 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) Behavior appears to lack observable goal, intention, or

explanation—for

(Main & Solomon, 1990) 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).

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 *Secure/balanced:* Relaxed, *Secure*: Reunion behavior is base for exploration. Reunion intimate, direct expression of confident, relaxed, open. behavior is smooth, open, feelings, desires. Able to Positive, reciprocal interaction or warm, positive. negotiate conflict or conversation. disagreement.

A *Avoidant*: Detached, neutral *Defended*: Acts to reduce *Avoidant*: Maintains affective nonchalance, but does not emotional involvement neutrality; subtly minimizes avoid interaction altogether. or confrontation. and limits opportunities Avoids physical or Focuses on play and for interaction. psychological intimacy. exploration at expense of interaction.

C *Ambivalent*: Protests separation *Coercive*: Maximizes *Ambivalent*: Heightened strongly. Reunion psychological involvement intimacy and dependency characterized by strong with parent; exaggerates on parent. Reunion characterized proximity-seeking, problems and conflict. Is co- by ambivalence, subtle hostility, babyish, coy behavior. coercive, for example, threaten- exaggerated cute or babyish ing (resistant, punitive) and/ behavior. or disarming (innocent, coy)

D *Controlling/disorganized*: *Controlling*: Signs of role

Characterized by controlling reversal: punitive (rejecting,

behavior (punitive, caregiving) humiliating) or caregiving

or behaviors associated (cheering, reassuring, falsely

with infant disorganization. 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/other*: Mixture of *Unclassifiable*: Mixture

of

insecure indices that do not fit into any of the other groups. incoherently in relation to fit

into any of the other groups.

parent.

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

groups = A, B, C, A/C.