Developmental Psychology
2003, Vol. 39, No. 3, 417–422

0012-1649/03/$12.00 DOI: 10.1037/0012-1649.39.3.417

Are There Really Patterns of Attachment? Comment on Fraley and Spieker (2003)

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Ainsworth's description of attachment patterns in the Strange Situation is one of the best known and most enduring descriptive insights in developmental psychology. Yet attachment theorists have paid little attention to whether ABC classifications represent a true taxonomy or to mechanisms that might produce truly distinct patterns of attachment. This comment focuses on three questions. Does attachment theory require distinct patterns of attachment? How can taxonomic analysis contribute to an understanding of individual differences in attachment security? And are attachment theorists asking the right questions? The authors conclude that attachment theory is indifferent to the structure (taxonomic or dimensional) of individual differences. Nonetheless, taxonomic search methods can make important contributions to attachment study if research is broadened to include secure base behavior in naturalistic settings.

Mary Ainsworth's description of avoidant, secure, and resistant (A, B, C) attachment patterns in the Strange Situation (Ainsworth, Blehar, Waters, & Wall, 1978) is one of the best known and most enduring insights in developmental psychology. It has been the basis for extremely productive research designs, data analytic strategies, further descriptive insights, assessment at older ages, and a number of interesting theoretical extrapolations. At the same time, attachment researchers have been fairly criticized for reifying the A, B, and C classifications, too readily generalizing them beyond the reunion context in which they were discovered, and treating them as traits rather than as relationship specific.

In view of the importance of the ABC classification system, it is surprising that attachment theorists have paid so little attention to whether these categories represent a true taxonomy or a mere measurement convention. It is also surprising that there has been so little discussion of mechanisms that might produce truly distinct patterns of attachment. Fraley and Spieker's (2003) maximum covariance (MAXCOV) analysis of attachment patterns in the Strange Situation brings welcome attention to these issues. It is also a welcome introduction to and illustration of the logic, value, and difficulties of taxonomic search methods that deserve to be better known in developmental psychology.

An Inordinate Fondness For Types

One of the primary goals of science is to simplify. One of the most basic simplifications is to group similar entities into categories. Valid taxonomies carve Nature at its joints. In doing so they add information that goes beyond mere descriptive knowledge of the classified entities. They also make the world comprehensible in real time to humans' limited memory and reasoning capacities. It is not surprising, therefore, that we so readily find category schemes plausible and comfortable.

As Gould (1985) has noted, the Western intellectual tradition emphasizes clear distinctions and immutable entities and guides us as scientists to seek sharp essences and definite boundaries—this despite the fact that "Nature so often comes at us as irreducible continua" (p. 41). But the ability to see similarities across complex situations and contexts and to anticipate risks and benefits on the basis of just a few shared features is no mere artifact of the Western tradition. It is one of the hallmarks of human cognition (Caudill & Butler, 1992; Epstein, 1994; Mithen, 1996) and one of the reasons humans have managed to exploit almost every terrestrial niche on the planet. Most animals readily learn discriminations and associations that are important in the niche they occupy. But none are as multidimensional or general-purpose pattern detectors as humans. Slow afoot and lacking both armor and claws, we manage by recognizing similarities between what is familiar and what is new and by using exquisitely complex representations of past experience to anticipate risks and benefits in new contexts. Although we think of ourselves as smart enough to cope with all kinds of problems, we in fact manage best the problems we anticipate and manage to avoid. Our ability to detect and abstract patterns is critical to our success in this endeavor.

The kinds of cognitive architectures that are best suited to detecting similarity across complexity and providing intuitive anticipations are also the best architectures for simplifying complexity by reducing it to categories, prototypes, and stereotypes. Although great skill at finding and abstracting patterns may be an important complement to our rather limited memory and reasoning systems, it is also reason for caution. Because we are so adept at abstracting patterns and organizing experience into categories, proposed taxonomies should be considered suspect until they have been carefully validated—and not because such hypotheses are always wrong. Indeed, nature (including human behavior) offers

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countless examples of true taxonomies. They should be considered suspect because we so readily see patterns and types when there are none and because we find the simplification afforded by typological thinking and description so agreeable. Spurious category schemes (e.g., in evolutionary theory, physical anthropology, personality psychology, psychiatry) have often delayed important descriptive insights and stood in the way of imaginative problem solving. They have also provided the underpinnings for unfortunate stereotypes, prejudices, and social policies. We are simply too good at abstracting categories and types to believe our own eyes.

Mechanisms of Taxonicity

Most behavior is the product of many causes. The aggregate effect of multiple causes is ordinarily a range of individual differences that are dimensional and normally distributed. Individual differences are only organized into distinct patterns or types when specific mechanisms are in play. These include discrete regulatory functions (as in walking, trotting, and galloping), nonlinearities in control systems, affordances in the physical environment, and structures in the social environment. In general, hypotheses about taxonicity should include testable references to mechanisms that could explain why individual differences are organized as taxa rather than dimensions. This was the case in Meehl's (1965) work on a single-gene theory of schizophrenia. When it is premature to suggest specific taxogenic mechanisms, as when taxonomic structure is *discovered* rather than *predicted*, the question of mechanisms deserves high priority in theoretical analysis and research. In practice, such mechanisms are rarely mentioned.

Patterns of Attachment: What Does the Theory Require?

Attachment theory is so closely associated with the Strange Situation and the concept of discrete attachment patterns that many psychologists (and textbook authors) assume such patterns are integral to the theory. In fact, the theory neither requires nor predicts discrete patterns of attachment. The discovery that individual differences in secure base behavior are organized into discrete patterns would be an important descriptive insight into infant behavior. It would also raise interesting questions for attachment theory, not least about the mechanisms that produce taxonicity. But neither Bowlby's (1969) key descriptive or theoretical insights nor the overall logic of the theory is in the balance when we examine the structure of individual differences in infant attachment relationships.

The Logic of Attachment Theory

One of John Bowlby's (1969) goals in developing attachment theory was to preserve some of Freud's genuine insights about relationships and early experiences by recasting them in a more scientifically defensible framework. He was particularly interested in Freud's view that infant–mother and adult–adult relationships are similar in kind and that early relationship experiences provide a prototype for later love relationships.

To preserve these important insights, Bowlby (1969) first replaced Freud's view of the needy dependent infant with a view of infants as competent and interested in their environments. He also replaced Freud's drive reduction motivational theory with one based on control systems theory. In Freud's view, infant behavior was organized around the management of rising instinctual drives. At high levels, drives are toxic. The mother is important primarily as an object through which drives can be reduced. Bowlby recognized that such formulations were theoretically questionable and not accessible to empirical analysis. These formulations also overlooked important facts about the infant's sensitivity to the environment, to context, and to past and recent experience. In control systems theory, Bowlby found a more rigorous and empirically accessible approach to the organization, context sensitivity, and apparent purposefulness of infant behavior.

Control systems are devices that monitor and integrate diverse sources of information and initiate behavior that maintains a system within bounds defined by a *set goal*. Bowlby (1969) defined the set goal of the attachment system as a degree of proximity or access to the caregiver. Sroufe and Waters (1977) suggested that the criterion might instead be a sense of felt security rather than distance or access per se. Bowlby recognized that although a control systems model provided an alternative to drive theory, it could be criticized as just one magic replacing another—unless he could explain how an infant could have such a control system. For this he turned to ethology and evolutionary theory.

Bowlby (1969) cited a wide range of examples from animal behavior to illustrate that evolution can endow a species with biases in learning abilities. These interact with structure in the environment to put together the components of control systems that organize a wide range of complex behavior patterns such as predation, courtship, parenting, and territoriality. Bowlby speculated that evolution had provided biases in human infants' learning abilities that, in an ordinary caregiving environment, made it relatively easy to put together the components of an attachment behavioral system. His emphasis on the role of experience in attachment development is important. The quality and quantity of care inevitably vary from one caregiver to another. Accordingly, there are individual differences in the development and operating characteristics of infant secure base control systems. This fact implies that infants will differ in their ability to use their primary caregiver as a secure base across time and contexts. It does not imply that these differences will be organized along continuous dimensions or into distinct patterns of attachment.

Mary Ainsworth and Patterns of Attachment

Mary Ainsworth's descriptive insights into individual differences in maternal care, infant secure base behavior at home, and responses to separation and reunion in the Strange Situation were among her most important contributions. A keen observer, she was no armchair psychologist building measures from informal experience and tortured logical analysis. Nor was she an operationalist for whom validity was a matter of definition, not data. She was committed to the importance of ethological observation, and at critical moments in her research she could be found clipping up transcripts of detailed behavioral observations and designing measures around what mothers and infants actually did. Attachment was, for her, a relationship played out with a particular partner across time and contexts in naturalistic settings. Accordingly, she always viewed the Strange Situation as a tool, not a topic, arguing in her 1979 Society for Research in Child Development presidential address that "the more we use . . . [the Strange Situation,] the sooner we can be finished with it."

In addition to being a keen observer, Mary Ainsworth was a skilled psychodiagnostician familiar with psychiatric nosology and well aware of the similarities underlying diversity in human behavior. Her dissertation research (developing self-report measures of adult security), her experience with clinical assessment, and her attachment studies all impressed upon her the fact that individual differences are often most apparent in profiles of several variables than in any single variable. Thus the term *patterns of attachment* originated less as an assertion about taxonicity than about the fact that important individual differences are often expressed in profiles (or patterns) of multiple variables. To be sure, Ainsworth regularly spoke of Strange Situation classifications as distinct patterns of attachment. Initially this was a matter of economical expression, not a hypothesis about taxonicity. She ultimately concluded that differences observed in the Strange Situation did indeed mark distinct groups. As much as she believed this, and as much as it may have influenced her data-analytic strategies, neither the value of her insights into maternal care and secure base behavior nor the coherence of her theoretical reviews is in the balance when we examine the taxonicity issue empirically.

Patterns of Attachment: What Do the Data Suggest?

Even though attachment theory is formally indifferent to the taxonomic or dimensional structure of individual differences, the taxonicity hypothesis deserves an empirical test. Unfortunately, the multivariate methods most familiar to developmental psychologists do not provide strong tests of such hypotheses (Beauchaine, in press). Fraley and Spieker (2003) made a significant contribution by introducing the MAXCOV taxonomic search method to developmental research. In addition to providing strong tests of the attachment taxon hypothesis, MAXCOV analysis and related methods are applicable to a wide range of questions in other areas of developmental research.

Taxonomic Search Methods

MAXCOV (Meehl, 1973) is a method for determining whether a sample of observations is homogeneous or represents a mixture of two qualitatively distinct types, or taxa. Meehl and his colleagues developed MAXCOV as a tool for evaluating his single-gene theory of schizophrenia (Meehl, 1962). Under a single-gene model, there is necessarily a true taxonomy defined by those who do and do not carry the allelic variant of the relevant gene. In contrast, polygenic models predict a continuum of schizophrenicity associated with the number of "bad" alleles a person inherits. Deciding between these models was important because they suggest very different types of mechanisms that may have alternative implications for intervention.

Because genotypes were unobservable, the single-gene theory could not be tested directly. Meehl (1965) recognized, however, that a "schizotaxic" genotype might be inferred by searching for taxonicity among readily observable phenotypic indicators, such as anhedonia and formal thought disorder. Unfortunately, phenotypes are not perfect markers of a genetic variant unless the gene is fully penetrant. In other words, not everyone with the hypothesized schizotaxic genotype could be expected to develop full-blown schizophrenia. Thus, the schizotaxic genotype was necessarily a latent taxon that would have to be detected without knowing for certain which individuals carried the hypothesized gene. As Meehl (1965) somewhat quixotically described it, the challenge was one of "Detecting Latent Clinical Taxa by Fallible Quantitative Indicators Lacking an Accepted Criterion." A number of taxometric studies have supported the latent taxon hypothesis using a diverse range of measures including premorbid behavioral functioning (Tyrka et al., 1995), Minnesota Multiphasic Personality Inventory schizoid items (Golden & Meehl, 1979), perceptual aberration (e.g., Lenzenweger & Korfine, 1992), and social anhedonia (Blanchard, Brown, Horan, & Gangestad, 2000).

Meehl's decades-long research program is a classic study in problem definition, imaginative research strategy, and rigor and tenacity in a very uncertain research context. Importantly, the taxonomic search methods Meehl developed along the way can be useful in many other contexts (see Haslam, 1999). Psychiatrists and clinical, personality, and social psychologists have used these methods to (a) decide between theories that make different predictions about taxonicity and (b) "discover" heterogeneity among subjects, both as a starting point for theory building and as a means of validating hypothesized typologies (e.g., Gangestad, Martin, & Bailey, 2000; Harris, Rice, & Quinsey, 1994; Kordinak, Strong, & Greene, 2002; Ruscio, Ruscio, & Borkovec, 2001). Although these methods are not widely known among developmentalists, they could be quite useful in research on stages versus sequences and on risk and early experience and as tools to validate the wide array of measures and evaluations that are built on classifications and typologies.

The Logic of Meehl's Taxonomic Search Methods

Meehl's taxonomic search strategies exploit the fact that given an adequate effect size, mixing subjects from two distinct groups will create a correlation between any two variables that are indicators of group membership even if the variables are uncorrelated within either group. MAXCOV analysis examines the covariance (unstandardized correlation) between two variables (x and y) at different levels of a third variable (z). The logic is that if z is an indicator of the underlying taxon (T versus not-T), the low range of z includes predominantly subjects from group T, the middle range of z includes a mixture of T and non-T subjects, and the high range of z includes subjects primarily from the complementary group (not-T). Thus, if a sample consists of two distinct types of subjects, the covariance between x and y is expected to be low among subjects with low scores on z, highest among subjects in the middle range of z, and low at the high range of z.

Figure 1 illustrates the logic of MAXCOV analyses. X, y, and z are valid indicators of the hypothesized latent taxon. That is, there are mean differences of one standard deviation or more between taxon members and nonmembers on each of these variables. Because z is related to group membership, most subjects in the low range of z are members of the hypothesized taxon. The middle range of z encompasses both taxon members and nonmembers. And most subjects in the high range of z are nonmembers. Correspondingly, the covariance of x and y (reflected in the overlaid regression lines) is low in the low range of z, increases in the middle range, and declines in the high range. This produces the characteristic convex covariance plot that signals taxonicity in

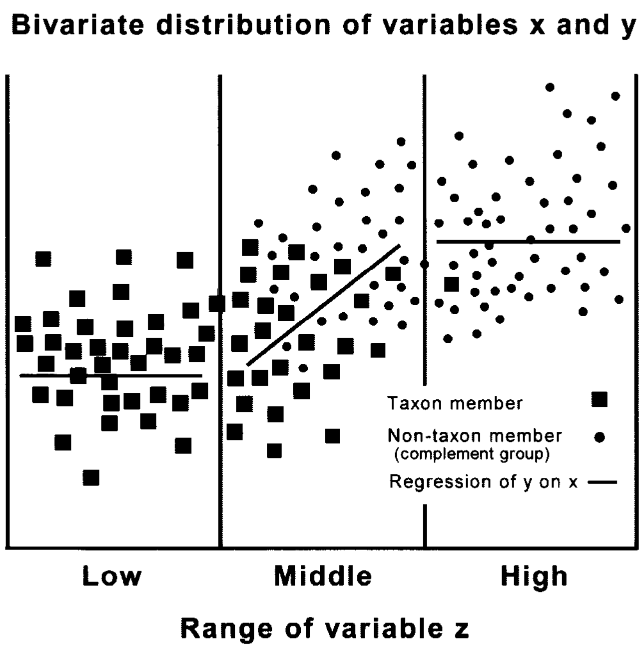

Figure 1. The logic of MAXCOV analysis.

MAXCOV analyses. If there were no underlying taxon, there would be no changes in group membership and sample composition at different levels of *z*, and the covariance of *x* and *y* would remain relatively constant across the full range of *z*.

Generally, when a number of indicators are available, MAXCOV analysis is performed with all possible combinations of three indicators at a time. This is done to avoid reporting results that are specific to a particular set of indicators. Fraley and Spieker (2003) conducted MAXCOV analyses on contrasts between primary attachment groups (A vs. non-A, B vs. non-B, and C vs. non-C), Strange Situation subgroups (e.g., B3 vs. B4), and factors extracted from the set of Strange Situation variables. Indicator variables were identified by correlating proximity seeking, contact maintaining, avoidance, and resistance from reunion Episodes 5 and 8 and an overall score on disorganization with group membership (A vs. non-A, etc.). Independent ratings of these variables by pairs of raters were treated as separate indicators. Only those variables that correlated .20 or greater with an attachment group or subgroup (or .30 with one of the principal components of the variable set) were used as MAXCOV indicators.

MAXCOV analyses using these indicators (three at a time) resulted in a very large number of MAXCOV tests of taxonicity in the A versus non-A classification ($n = 660$), the B versus non-B classification ($n = 495$), and the C versus non-C classification ($n = 660$). There were fewer indicators of attachment subgroups and correspondingly fewer tests for these classifications. The factor analysis identified 12 potential indicators of the first principal component and 6 of the second. In traditional hypothesis testing, such a large number of trials would raise concerns about capitalizing on sample-specific variance. This is not a concern in taxonomic search because the focus is not on individual trials. Instead, the large numbers of indicators and tests are treated as consistency tests on one another. Taxonicity is indicated only if the preponderance of MAXCOV trials is positive and yields similar base rate estimates for the taxon group.

Overall, Fraley and Spieker's (2003) analyses provide a rather thorough search for taxonomic structure in the Strange Situation. They concluded that neither the major Strange Situation classifications (A, B, C) nor the subgroups (B1, B4, etc.) showed much evidence of taxonic structure. That is, individual differences in the Strange Situation seem organized in terms of dimensions, not types.

What To Look For (and How)

Fraley and Spieker's (2003) systematic evaluation of taxonicity in primary attachment groups, subgroups, and principal components is a particular strength of their article. It is also one of its weaknesses. As noted above, they have taken the Strange Situation as given and examined the full range of potential taxonomic distinctions implied in the Ainsworth et al. (1978) scoring system. But doing so takes their article into analyses that are of little theoretical importance and have little descriptive value. This is particularly true of the subgroup analyses. In our experience, subgroup distinctions exist because it is easier to assign a secure, avoidant, or resistant classification if one recognizes that there is diversity within each group. As discussed above, none of the key postulates of Bowlby's (1969) attachment theory addresses individual differences at this level. Indeed, lacking any theoretical basis for making predictions about subgroups, most attachment researchers have focused on the orthogonal contrasts of secure versus insecure and avoidant versus resistant groups. In our view, Fraley and Spieker's contribution would have been stronger had they focused on these key contrasts. Doing so would also have increased their article's value as an illustration of taxonomic search methods.

Selecting Indicators

Meehl and his colleagues have conducted a number of Monte Carlo studies and consistency tests examining the robustness of his taxometric methods under various conditions (Beauchaine & Beauchaine, 2002; Cleland & Haslam, 1996; Meehl, 1995b; Meehl & Yonce, 1996). Although the results have generally been encouraging, the methods are still relatively new and their operating characteristics in many contexts are not well known. One of the most challenging issues concerns the selection of indicator variables.

It is important that indicators be independent, be less correlated within both the taxon group and the complement group than in the mixed sample, and provide substantial discrimination between a hypothesized taxon and its complement. It is also useful to employ indicators from different assessment modalities or domains (Meehl, 1995a; Beauchaine & Waters, in press).

It is difficult to know whether one can find within the constraints of a 3-min Strange Situation episode a range of truly independent behavioral indicators. For example, behaviors that are effectively independent over the course of an entire day may, within any brief interval, be complexly intertwined. It is hard to estimate the effect of such constraints on MAXCOV analyses of Strange Situation variables. It is also hard to estimate the effect of using the same variables from repeated episodes. Clearly, averaging across episodes would provide more reliable scores. Finally, it is difficult to estimate the effect of having all the variables (and the classification) scored by the same person.

Constraints imposed by sampling intervals, use of the same variable from repeated episodes, use of independent ratings as separate indicators, and the use of a single rater for all the indicator variables also raise concerns about the sensitivity of the analysis to taxonicity. Because MAXCOV analysis depends on the covariance of indicators being low at the extremes of a third indicator, that is, in relatively unmixed samples of the hypothesized taxon and its complement, it would be useful to have a fuller treatment of indicator correlations within attachment groups. If, as we expect, they are substantial, this would reduce MAXCOV's sensitivity to taxonic structure.

Independent Scorers as Separate Indicators

Given independent ratings on a set of variables, the most conventional strategy would be to combine them to obtain more reliable scores. In correlational analyses, this is accomplished by z scoring and averaging. In structural equation modeling, it is accomplished by extracting a maximum likelihood factor from the multiple indicators. Increasing the reliability of indicator variables can only increase the sensitivity of MAXCOV analyses. Fraley and Spieker (2003) chose instead to treat their independent ratings of each Strange Situation variable as separate indicators, increasing the number of indicators rather than their reliability. In fact, taxonomic search reaches maximum efficiency with as few as 7–10 indicators (Beauchaine & Beauchaine, 2002). Therefore, the better choice may have been to combine the independent ratings.

The large sample available for this project was a great advantage. Presumably, however, the two raters, A and B, who rated each behavioral variable were not the same individuals for the entire sample. That is, A1 and B1 would have rated the data from one research site, A2 and B2 from another, and so forth. In principle, different means and standard deviations among the A and B coders would introduce error into the indicators and reduce the sensitivity of the MAXCOV analyses. As mentioned earlier, it is difficult to estimate how great an effect this might be.

Confirming the Null Hypothesis

As mentioned previously, continuous normally distributed individual differences are the rule when several causal variables are in play. Unfortunately, MAXCOV analysis and related methods cannot directly test the hypothesis that individual differences are organized along continuous dimensions. They test for taxonicity. Dimensional structure is, so to speak, the null hypothesis. Because there are both valid and spurious reasons for null results, failure to detect taxonicity is not strong evidence for dimensional structure (see Beauchaine, in press).

This is a difficult and unavoidable problem. As indicated above, a number of factors in the selection of indicator variables can reduce MAXCOV's sensitivity to taxonomic structure and yield false negative results. Sample characteristics can also reduce MAXCOV sensitivity. For example, the NICHD Study of Early Child Care sample is exceptionally diverse along many dimensions including day-care history. In our experience, day-care history clearly complicates the scoring (and possibly the validity) of Strange Situation reunions. Analyses of relatively homogeneous subgroups in the sample would have been a useful way to determine whether heterogeneity in the sample reduced the sensitivity of the analyses.

Another difficulty inherent in MAXCOV analysis is related to the issue of indicator validity, discussed above. MAXCOV analysis is sensitive to taxonomic structure only if the hypothesized taxon members and nonmembers differ by at least one standard deviation on each of the indicator variables (Beauchaine & Beauchaine, 2002; Meehl, 1995a). Fraley and Spieker's (2003) strategy of evaluating potential indicators by correlating them with Strange Situation classifications is useful but not definitive because the classifications are themselves imperfect indicators of membership in the latent taxon. The best evidence is obtained by testing the effect size for each of the indicators with respect to group membership as identified by the MAXCOV analyses, that is, after the fact. Unfortunately, this is possible only if the analysis detects taxonicity. If the results are negative, one cannot evaluate the relevant effect sizes and thus cannot distinguish between low indicator validity and true dimensional structure.

Looking for Taxa in All the Wrong Places

Modern attachment theory began with Bowlby's (1969) reformulation of the nature of the child's tie to its mother. Freud saw infants' neediness, clinging, and dependence on their mothers as a means of drive reduction. In contrast, Bowlby saw infants as active, curious, and interested in their environments, and their primary caregivers as both a secure base from which to explore and, as needed, a haven of safety in retreat. Ainsworth's observations in Uganda and her home observations in Baltimore confirmed the value of the secure base formulation. Her Baltimore observations also highlighted the range of individual differences in secure base behavior at home. The validity of the Strange Situation rests on its links to secure base behavior at home. To be secure in infant attachment means to be able to effectively use the primary caregiver as a secure base across time and contexts in naturalistic settings. This, not behavior in the Strange Situation, is the theoretically prescribed criterion for calling an infant secure. Similarly, if an infant is unable to effectively use its primary caregiver as a secure base across time and contexts in and around the home, it makes little sense to call the infant securely attached on the basis of generally positive behavior in the Strange Situation.

The fact that secure base behavior across time and contexts is central to attachment theory raises an important question about the search for taxonicity in patterns of attachment. Should we be looking for taxonicity in the Strange Situation or in home observation data? If the structure of individual differences in the Strange Situation and at home were necessarily the same, the Strange Situation would certainly be the more available source of data on large samples. But it is not at all clear that taxonicity, or the lack thereof, in Strange Situation data implies that secure base behavior at home follows the same model. There are certainly enough Attachment Q-Sort data available to test the hypothesis that individual differences in secure base behavior at home are taxonomic or dimensional.

We can hardly fault Fraley and Spieker (2003) for having followed the field and focused on the Strange Situation. Indeed, their work is a useful antidote to reification of Strange Situation classifications. Moreover, their results come as no surprise to anyone who has tried to compile prototypical examples of attachment classifications from Strange Situation videotapes. If anything, the field should be faulted for letting a test so displace Bowlby's and Ainsworth's key descriptive insights about the way infants get along in the world.

Conclusion

Taxonomic search involves a number of difficult decisions. There are often a number of ways to implement tests of hypothesized taxa. In addition, the results of taxonomic search analyses such as MAXCOV depend on the availability and validity of indicator variables. Under ideal circumstances, identification and validation of indicators should precede data collection. Where possible, method variance and halo effects should be avoided by using carefully designed rating protocols and drawing indicators from diverse measurement domains and modalities. Unfortunately, there are no significance tests or formal criteria by which to evaluate taxonomic search results. Conclusions depend on the plausibility of the hypothesized taxonomy and the preponderance of the data from multiple trials with different sets of indicators.

It is often difficult to estimate the effect of sample characteristics, indicator selection, and other design decisions on MAXCOV's sensitivity to latent taxa. Both false positive (e.g., Beauchaine & Waters, in press) and false negative (Beauchaine & Beauchaine, 2002) results are possible. Fraley and Spieker's (2003) approach to the attachment taxon problem is thorough, thoughtful, and shows considerable finesse. Where there are weaknesses, they arise from difficult decisions or from compromises required by MAXCOV analysis. Ultimately, answers to questions about attachment taxonicity require a convergence of evidence from diverse data sets and research designs. In taxometric research, a single study is rarely the last word.

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Received June 19, 2002
Revision received November 5, 2002
Accepted December 30, 2002 ■