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Cognitive Underpinnings of Narrative Attachment Assessment

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Traditional story completion methods used to examine attachment representations in childhood draw heavily on socially significant content and clinical judgment. Using these methods with 37-month-olds, Bretherton, Ridgeway, and Cassidy (1990) found that attachment security scored from story completions were related to a wide range of secure base, personality, intellectual, and family variables. We examined story completions from 24 of Bretherton et al.'s (1990) subjects who had also produced story completions at 54 months, but scored passage length (idea units) and scriptedness. Results captured much of the attachment-related variance associated with the traditional scoring, but had better discriminant validity vis-à-vis general developmental level. These results indicate that analysis of cognitive variables underlying conventional scoring can advance understanding of attachment representations and their relations to the organization and content of attachment-related narratives. © 1998 Academic Press

Freud's legacy is one of important insights cast in terms of unscientific explanations. In order to preserve Freud's ideas about the importance of relationships, John Bowlby redefined the nature of the child's tie to its primary caregiver and introduced a control systems alternative to Freud's drive reduction theory of motivation. Where Freud saw clinging and dependency, Bowlby (1969, 1973) saw infants actively exploring their environments, supported by confidence in their caregiver's availability and responsiveness. Bowlby explained the complexity and context sensitivity of infant secure base behavior in terms of a behavioral control system which he considered part of our primate evolutionary endowment.

Unlike Freud, Bowlby felt that the infant's relationship was significantly shaped by real (as opposed to fantasy) experience—whether the caregiver is sensitive or insensitive to its signals, available or unavailable, cooperative or

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interfering. Experiences with caregiver sensitivity, availability, and nonintrusive interaction lead to expectations about the caregiver as a secure base from which to explore. Thus an infant or child is termed "secure" if it is confident in the availability and responsiveness of its primary caregiver and able to use the person effectively as a secure base from which to explore and a haven of safety in retreat.

In infancy, experiences with a caregiver are predominantly sensorimotor representations. They are associative, activated by specific contextual cues rather than intention, not verbalizable, and not yet objects of reflection. With the emergence in early childhood of more formal representations, children are increasingly able to discuss their past experiences and expectations. Attachment theorists say that the child's secure base has become "portable". For the first time, children can be confident of the caregiver's availability and responsiveness even when they are at school or playing away from home with friends.

Borrowing from Craik (1943), Bowlby referred to formal representations of experience with a primary caregiver as "working models." Current attachment assessments for children and adults are based on the notion that every individual constructs a mental representation of experience with attachment figures (see Crowell & Treboux, 1995; Oppenheim & Waters, 1995 for reviews of adult and child assessments).

Though productive, Bowlby's program for translating psychoanalytic insights into the language of cognitive psychology is not yet complete. In many respects, the cognitive psychology of his day was not yet up to the task. In addition, although clinicians and experts in social development have drawn on cognitive research, social behavior and social cognition are not yet assigned high priority on cognitive research, social behavior and social cognition are not yet assigned high priority on cognitive psychologists' agenda. The goal of this article is to examine current issues in attachment assessment from the point of view of current cognitive theory and research on narrative representation. Relatively new in Bowlby's day, this area has advanced rapidly in recent years. In step with this advance, attachment research has moved away from purely behavioral assessments (Ainsworth, 1967; Ainsworth, Blehar, Waters, & Wall, 1978) toward the level of representation (Bretherton, 1987, 1990; Main, Kaplan, & Cassidy, 1985; Oppenheim & Waters, 1995).

The change in focus from secure base behavior to attachment representations presents new and potentially difficult assessment problems. Infant attachment security is assessed by examining secure base behavior at home or in the laboratory. Attachment representations are not accessible to direct observation. In a paper entitled "Security in infancy, childhood, and adulthood: A move to the level of representation," Main, Kaplan, and Cassidy (1985) proposed that individual differences in attachment will be related not only to nonverbal behavioral assessments, but to patterns of language and structures of the mind. In keeping with this hypothesis, Main and her colleagues developed the Adult

Attachment Interview to assess the coherence of adult accounts of attachment relevant experiences (George, Kaplan, & Main, 1985, 1996; Main & Goldwyn, 1985–1995). An individual is designated secure if their account of attachment-related experiences (and their effects on development) is consistent, coherent, and believable (see Crowell & Treboux, 1995 for a review). Similar criteria, along with the consideration of the ability to communicate openly and constructively, have been used successfully to assess attachment security in children.

The narrative assessments used with children range from interpreting presented pictures or three-dimensional enactments to more open-ended procedures such as completing story stems. The systems for scoring such tasks incorporate both cognitive constructs (e.g., coherence) and social and/or emotional constructs (e.g., the interactive styles of the children, the emotional tone of the story productions, etc.). Such scoring can be quite effective for the goals of a particular study. For example, Bretherton, Ridgeway, and Cassidy (1990) developed a story completion task appropriate for children as young as 37 months old and assigned security scores on the basis of story content and the child's ability to respond without repeated prompting. These scores were significantly related to a wide range of secure base behaviors, personality and family variables, parent marital satisfaction, and developmental quotient (see Oppenheim & Waters, 1995 for a review of similar studies).

Although attachment scores based on complex, subjective judgments can be reliable and valid and advance our understanding of attachment beyond infancy, they are difficult to map onto specific cognitive processes or structures. Global ratings of story security, often across the several stories per child, obscure the variability of individual stories, making it difficult to know how different features of the stories were weighted. In addition, the subjective/clinical judgments used to arrive at scores obscure the roles and interrelations of socially significant content and cognitive features. These problems make it difficult to tie findings from attachment representation research into basic findings in cognitive development. They may also account, in part, for the fact that we know little more about the cognitive structure of "attachment working models" today than we did when Bowlby introduced the term.

PROTOTYPIC SCRIPT RESOLUTION AND SECURITY

As indicated above, global assessments say very little about specific cognitive features of story completions that might reflect important aspects of children's attachment representations. This stands in contrast to the theoretical discussion which often makes reference to "scripts" as building blocks for attachment representations (e.g., Bretherton, 1991). Scripts consist of specific cognitively based characteristics that would have to be scored for presence or absence in secure children's story completions.

Following Ainsworth's work on infant–mother interaction (Ainsworth, 1997; Ainsworth, Blehar, Waters, & Wall, 1978) and infant secure base behavior

(Ainsworth et al., 1978; Waters, 1995, we have defined the key components of the secure base script as (1) the child explores away from the caregiver, (2) the child maintains contact or returns if necessary, (3) some difficulty or threat arises, (4) the caregiver approaches or the child seeks proximity, (5) the difficulty is dealt with, and (6) the caregiver (or contact with the caregiver) enables the child to return to exploration. The difficulty or threat can be dealt with in variety of manners by removing the difficulty, removing the child, providing the child with an explanation of the situation which neutralizes the difficulty, or some combination of these.

Except for the concluding element (recovery and return to play), this definition corresponds closely to the secure base concept that implicitly guided Bretherton et al.'s (1990) scoring. We included recovery and return to play because (1) Bowlby defines this as a key function of the attachment behavior system and (2) it is a critical element in well-validated systems for scoring attachment security in infancy (Ainsworth's strange situation) and childhood (E. Waters' attachment Q-set). Such a script provides the child with a framework for understanding what has happened, defusing the situation if there is some emotional upset, and getting things back to normal. This definition of the secure base script also makes it possible to pursue relevant script-based features in children's story productions. This in turn should better inform us about key cognitive features underlying attachment representations and move us toward a more detailed, cognitively based understanding of attachment working models.

Script-Based Cognitive Variables

Both adult and developmental research have demonstrated that underlying semantic and episodic memory and other mental representations importantly influence the elaborateness and scriptedness of narrative productions (see Waters & Hou, 1987; Waters, Hou, & Lee, 1993; Waters & Lee, 1994). As such, these two variables were selected for the present analyses because they seem to formalize some of the cognitive features implied in traditional analyses of attachment-related narratives as well as relating directly to the narrative and script development literature.

Content elaboration. Research on early script development has repeatedly shown that scripts become more elaborate over time, containing more actions per script as children become older (Nelson & Gruendel, 1986). In addition, experience per se can increase the number of actions per script, independent of developmental level. Children with more preschool experience, for example, can produce more detailed scripts than children of a comparable age, but with less experience (Fivush & Slackman, 1986). This increase in content elaboration with age and experience has also been reported in studies of prose production, including those of narrative production (Waters, 1980; Waters & Hou, 1987; Waters, Hou, & Lee, 1993). Content elaboration can thus be viewed as an important feature of script development and, by inference, of coherent, well-

organized attachment representations. As a consequence, content elaboration in attachment-relevant narratives should be indicative of important individual differences in attachment representation.

Although researchers investigating attachment representation in children have noted aspects of content elaboration in secure children's productions, this variable has not been systematically investigated and is often left out of scoring systems that focus on emotional tone, defensive processes, interactive style, etc. For example, Main, Kaplan, and Cassidy (1985) observed that insecure children often evidenced topic restriction and lack of topic elaboration in conversation. They also included "I don't know" responses and silence on the low end of their rating scales of language fluency in their narrative assessments. Bretherton et al. (1990), in their narrative scoring system, gave avoidant scores to children who responded with "I don't know," thus failing to elaborate the story stem presented to them.

Prototypical script resolution. In addition to content elaboration, another important feature of scripts is their prototypical quality. Scripts have in fact been defined as prototypical scenarios of everyday activities, with any variations that occur following systematic rules, e.g., in "going to a restaurant," whether you are seated by a host or hostess or not depends on the type of eating establishment (Schank, 1982; Schank & Abelson, 1977). As a function of this prototypical definition, the early empirical work on scripts began by asking individuals to list what happens in these often-experienced scenarios (e.g., Bower, Black, & Turner, 1979). It was assumed that by tabulating a large number of descriptions of these events, the prototypical scenario ("script") would emerge. Using this research strategy as a guide, it would therefore seem appropriate to begin any assessment of attachment representation involving attachment-relevant scenarios by asking what would be included in a "prototypical" story about such scenarios.

In the Bretherton et al. (1990) attachment story completion study, the researchers did include a tabulation of different story stem endings that they found in their children's sample. For example, putting a band-aid on the hurt knee in the rock climbing story was a frequent part of the typical rock climbing story conclusion. In contrast, ignoring the hurt child who is then left at the park alone and without any comforting is a rare story ending. These listings of different story endings in the Bretherton et al. paper do provide a summary of the possible actions that could occur in the story completion, but they still do not provide a complete picture of the "prototypical" story ending that would be expected from a coherent attachment representation of the event scenario. For that, we have gone back to our proposed definition of a "secure script" in which the child has available to him/her a framework for understanding what has happened, defusing the situation if there is some emotional upset, and getting things back to normal. Thus, we define prototypical story endings on both logical, conceptual grounds derived from the definition of a secure script and the observed frequencies of actual endings as well. To the degree that the selected narrative task effectively taps into

the child's attachment representation and we are dealing with a socially healthy sample, these two sources of scripted endings should converge. The conceptually based definition has the advantage of providing a general secure script that can be used to code content in a wide range of attachment-related stories. It does, however, differ from more traditional techniques of script definition which define very specific scenarios and rely solely on frequency counts of script features.

THE CURRENT STUDY

The goal of the current study was to extend the analysis of Bretherton et al.'s data (1990) to determine whether variables from cognitive research on children's narrative skills can capture a significant portion of the attachment-related variance of traditional scoring methods. If so, then further analysis of the cognitive variables underlying such scores could advance research on the nature of attachment representations and their relations to the organization and content of attachment-related narratives. This approach might then also help us clarify links between cognitive developmental level and attachment-related story completions and interviews.

Consequently, we examined the videotapes from 24 3-year-old children from the Bretherton et al. (1990) story completion study who had also been retested at 4-and-1/2 years of age. At both ages, children had been presented with a three-dimensional enactment of story stems that set the stage for their story completions, which could involve behavioral as well as verbal responses. In the original study the story topics had been selected so that they would be relevant to attachment, and children received a global security rating encompassing all of their various story completions. The goal in the current study was to move toward the analysis of specific cognitive features that might reflect important aspects of children's attachment representations.

Based on key cognitive features of script-based representations described above, we examined both the degree of content elaboration in the story completions from Bretherton et al. (1990) and the prototypical scriptedness of those stories. The story completions had been obtained by presenting the child with a story beginning, enacted with doll figures, and then asking the child to say and/or enact what happens next. The number of idea units represented the degree of elaboration and was measured by counting the number of distinct ideas contained in the story completion, with both verbalizations and distinct actions included in the tabulation.

Story completions were ranked on scriptedness by asking raters to rank the stories with respect to the prototypical ending as determined by the secure script definition presented above and an initial perusal of all the story completions at the two ages from the Bretherton et al. sample (without knowledge of children's security assessment). Not surprisingly, the story endings that were most common fit the formal definition of a secure script quite well. As an example, the rock climbing story stem begins with the child falling off the rock and hurting his or

her knee. Given our definition of a secure script, simply putting a band-aid on the knee would not be sufficient. Rather, the parent should also show the child that they can climb the rock without getting hurt, thereby defusing the fear and anxiety-producing component of the situation and giving the child confidence that they can go rock climbing and not get hurt. Similar elaborations of secure scripted endings were also possible for the other story stems that were examined for the present analysis. The scriptedness ranking procedures have been used in previous research on narrative production (Waters, Hou, & Lee, 1993; Waters & Lee, 1994) and are based on a shell-sort ranking procedure described in Chignell and Patty (1987).

The key predictions of the study were that secure children would produce more prototypic (scripted) story endings, with greater content elaboration, indicative of a well-defined, script-based attachment representation. Children's scores on the E. Waters attachment Q-set at 25 months were used to assess children's security. Bayley scores and scores from a word checklist (language development assessment) at 25 months were used to establish that performance on the attachment-relevant story stem task was not simply a function of general cognitive and language functioning. Finally it was also expected that there would be consistency on the story completion measures across age from 37 months to 54 months. Across-age consistency was not reported in the Bretherton et al. (1990) study, which only reported on the 3-year-old data.

Methods

Participants and design. The original sample (Bretherton et al., 1990) was made up of 29 children at 37 months of age. The children formed part of a longitudinal study and had been assessed previously at 18 and 25 months on a variety of measures, including cognitive as well as attachment assessments. From this sample, 25 children completed the follow-up at 54 months. The 24 children selected for the present study were those with complete data on the attachment Q-sort task at age 25 months and the story completion task at both 37 and 54 months.

The study by Bretherton et al. (1990), contained four attachment-relevant story stems. For the purposes of the present study, only three of these were selected (Spilled Juice story, Hurt Knee story, Monster story). The fourth story was made up of two parts, the first part involving a parent–child separation and the second dealing with the parent–child reunion. Due to the two-part nature of the story, it was felt that it would be more difficult to score, particularly with respect to the scriptedness analysis, and was omitted from the present study on that basis.

Materials and procedure. All three story stems involved a Mom, a Dad, an older brother or sister, and a younger brother or sister as doll figures and were enacted within a three-dimensional display. The "child" in the enactment was always the younger doll figure. The story stems of the three story completions analyzed in the present study began as follows:

Spilled Juice Story

E: Can you help me set the table for dinner. (*Give child box with silverware and let them set the table.*)

E: Now put the family around the dinner table so they're ready to eat. Here is our family eating dinner and Bob (Jane) gets up and reaches over and spills his juice. (*Make doll knock cup off toy table.*)

Mother: Oh Bob (Jane), you spilled your juice! (*Reproachful tone of voice, but don't overdo; turn mom toward child and move her up and down while she's talking.*)

E: Show me and tell me what happens now.

Rock Climbing/Hurt Knee Story

E: O.K., Look what I've got. (*Set out piece of green felt and sponge rock.*) This is the park. Here is our family and they're walking in the park, and at this park there is this high, high rock.

Child: Look mommy and daddy. Watch me climb this high, high rock. (*Make child climb rock, then fall off.*) Boo-hoo, I've hurt my knee (*crying voice*).

E: Show me and tell me what happens now.

Monster in the Bedroom Story

(*Place a toy bed on one side of the table.*) *E:* Look what happens now, listen carefully.

Mother: (*Face mother toward child doll and move her slightly as she speaks.*) It's bedtime. Go up to your room and go to bed.

Father: Go up to bed now. (*Same action as mother, deep voice.*)

Child: O.K. mommy and daddy, I'm going. (*Make child walk to bed.*)

E: Bobby (Jane) goes upstairs to his room, and he goes . . . ,

Child: Mommy! Daddy! There's a monster in my room! There's a monster in my room (*Alarmed tone of voice.*)

E: Show me and tell me what happens now.

In the original study by Bretherton et al. (1990), a videotape was made of each child completing the story stems at both 37 and 54 months of age. These tapes were retranscribed for the current study and the new transcriptions provided the story protocols that were used in the data analyses presented below. Both the children's verbalizations and behavioral movements (related to the story action) were included in the story protocols.

The procedures began with the mother and child playing in a room of toys for 10 min. They were then joined in the play session by the experimenter for a short period of time. When the child appeared at ease with both the environment and the experimenter, the mother was asked to sit in a corner while the story-telling task was conducted. The session began with a warm-up story about a birthday part where the child and the experimenter completed the story together to ensure that the child understood the procedure. The story stems, which represented familiar situations that were likely to elicit attachment themes, were then introduced one at a time in a standard order (Spilled Juice, Rock Climbing, Monster in Bedroom). At the end of each story stem, the child was asked to "show me" (using the dolls) and "tell me what happens next."

In addition to the request to say what happens next, the experimenter was also instructed in the use of three different types of prompts. The first focused on the story issue and was used only if the child failed to do so (e.g., "what did they do about the hurt knee?"). The second was a clarification prompt and was used if the

child talked about unspecified agents (e.g., "who put on the band-aid?") or moved the figures without describing their action ("what is she doing?"). Finally, the last type was used to elicit more elaboration ("anything else?"), unless the child indicated by speech or action that the story was finished. All prompts were worded so as not to suggest specific responses to the child.

Study Measures

The measurement section contains four sections. The first two sections describe the scoring procedures for both elaboration (number of idea units) and prototypic scriptedness of the story completions. The third describes the security scoring associated with the E. Waters Q-set and the fourth, the additional cognitive variables (Bayley scores and vocabulary checklist) that are included in the analyses [all are obtained from the Bretherton et al. (1990) study]. The two scorers for the two cognitive variables were the two authors of the current study that were not involved in the data collection for the Bretherton et al. (1990) sample. They both had extensive experience in conducting propositional analyses of content elaboration and scriptedness in narrative samples similar to the procedures described below.

Content elaboration. Content elaboration was assessed by counting the number of idea units contained in each story completion. An idea unit was defined as a distinct idea, presented by the child. For the purpose of this study, both direct verbalizations and distinct actions not represented in the verbalizations were scored as idea units. Although based on principles of propositional analysis, the present method of scoring idea units was less formal, due to the simple, action-based productions of the children. Nonetheless, high levels of agreement were found between the two scorers. One issue which arose, when scoring for idea units, concerned the behavioral enactments produced by the children. These were treated as distinct idea units only when they were not reiterated by a verbalization. This and other constraints due to repetition effects led to a number of rules which were followed by the raters in order to maintain consistency. These rules were as follows:

1. If the child repeated exactly the same phrase twice, with the second utterance immediately following the first, then the second utterance was not scored.
2. If the experimenter repeated a question or the whole story stem and the child gave a second answer identical to the first, then the repetition was not scored.
3. If the experimenter asked a question that was not directly related to the story stem and appeared to be leading the child off the point, then the child's response was not scored.
4. If the child used the dolls to enact a scene, but did not verbalize the actions, then the actions themselves were scored as idea units.
5. If the child used the dolls to enact a scene and also verbalized the actions, then only one of the instances, usually the verbalization was scored.

TABLE 1
Similarity of Scriptedness and Number of Idea Units across the Three Story Stems at Each Age

	Scriptedness	Idea units
37 months		
Spilled Juice & Rock Climbing	$r = .54, p < .01$	$r = .58, p < .01$
Spilled Juice & Monster in Bedroom	$r = .43, p < .05$	$r = .82, p < .001$
Rock Climbing & Monster in Bedroom	$r = .23, p < .29$	$r = .45, p < .05$
α reliability for averaged scores	.67	.83
54 months		
Spilled Juice & Rock Climbing	$r = .67, p < .001$	$r = .69, p < .001$
Spilled Juice & Monster in Bedroom	$r = .40, p < .05$	$r = .66, p < .001$
Rock Climbing & Monster in Bedroom	$r = .28, p < .17$	$r = .66, p < .001$
α reliability for averaged scores	.71	.86

Using this scoring system, the two individual scorers judged the number of idea units used in each story completion produced by each child across both ages. Agreement across the two scorers for each of the story types at each age, assessed by correlating their idea unit scores, was $r = .97, .98, .99$ for the Rock Climbing, Monster in Bedroom, and Spilled Juice stories, respectively, at 37 months of age, and .99, .98, .99 for these three stories, respectively, at 54 months of age. These scores were first averaged for each story across the two scorers. The scores were then averaged again across the three stories to produce a single mean idea unit story length for each child at each age. The mean idea unit length for the story completions was 6.65 idea units at 37 months and 12.10 idea units at 54 months, an increase of almost 100%, $t(23) = 4.46$, $p < .001$, t test for dependent samples. Table 1 presents the degree of similarity of idea unit length across the different story stems at each age as well as the α reliabilities of the averaged idea unit scores that are used in the analysis on attachment security and cognitive features of the story completions. Although there is some variability across story types, the α reliabilities of the averaged scores are both high and equivalent at the two ages.

Prototypic scriptedness of story completions. As indicated in the introduction, the present analysis focuses on cognitive features of the story completions per se and does not include social aspects of performance such as the child's emotional tone when engaging in the task or the general level of responsiveness to experimenter queries, which were incorporated into the Bretherton et al. (1990) more-global scoring system. As a consequence only the written transcripts of the story completions were used in the current data analysis. With respect to the scriptedness of the story completions, prototypic attachment scripts were defined for each story, and the actual story completions ranked according to how well they approximated the prototypic script. These definitions were based on the general secure base script described earlier in which the child moves from

exploration to contact with the caregiver and back to exploration as the difficulty or threat that is encountered is dealt with. Because of the age (and cognitive level) of the children, the difficulty is best addressed by the caregiver providing the child with a framework for understanding what has happened, defusing the situation if there is some emotional upset, and getting things back to normal.

The definitions of secure attachment scripts for each of the three story stems used in the current analysis are described below. The Spilled Juice script is presented last because of multiple interpretations. For the Rock Climbing/Hurt Knee story, a prototypical scripted ending involved not so much fixing the hurt knee (e.g., with a band-aid—viewed as an optional element), but comforting the child and showing him/her that rock climbing can be done safely without injury. A good ending might include the younger child (doll) being shown that the older sibling can climb the rock because they are bigger, but the younger child should not climb it. A moderately good ending involved fixing the knee (band-aid, hospital, cast) and a kiss (optional element, but viewed as helping gets things back to normal, moving the ending closer to the prototypical ending described above). A poor ending involved a story completion that did not deal with the problem or provided an odd ending.

For the Monster in the Bedroom story the prototypical ending changed somewhat with age, with a simpler approach of getting the monster (killing it, throwing it out the window, etc.) more common in younger children and the ideal response, showing the child that there really is no monster, more common at the older age. The latter approach emphasizes more strongly helping the child understand the situation and so represents the ideal attachment script ending vis-à-vis the secure script definition we have proposed. A particularly good ending would not only include an explanation of how there really is no monster, but also kisses, smiles, a song, or story, i.e., making sure everything is fine and getting things back to normal before the child goes to sleep. A moderately good ending would be to "get the monster," with a tuck-in (kiss, story, etc.) moving the ending closer to the ideal ending described above. Once again, a poor ending involved a story completion that did not deal with the problem or provided an odd ending.

Finally, the Spilled Juice story could be interpreted in two different ways by the children, leading to two different types of endings. If the spilled juice was viewed as an accident, then it was important to clean up the spill and provide the child with more juice, thereby getting things back on track. If the child also included comments about not doing that again, so much the better. A moderately good ending would involve simply cleaning up the juice. If, however, the spilled juice was interpreted as misbehavior, then some punishment was in order along with a statement that this shouldn't happen again. As long as the contingency was clearly expressed (e.g., in one story the child even explained how the punished child would be good when they came out of their room), this would warrant a high ranking on a good script resolution. A moderately good ending for this

TABLE 2
Sample Story Completions from Bretherton, Ridgeway, and Cassidy Study (1990)[a]

"Secure Script" completion to the Rock Climbing story—Example from a 54-month-old
Big sister and mommy and daddy come
And daddy picked her up
Now big sissy
"Watch mommy and daddy, I can climb this big rock and XXX not even fall"
[other girl]
Makes other girl climb to top of rock
"See"
Makes her climb down again
"Now I'm climbing down it"
"Now see Jane you have to do that now"
Makes Jane climb rock again
"There" [Jane]
Makes Jane climb down again
How 'bout the daddy?
Well, what did they do about the hurt knee?
I don't know
They put a bandaid on
O.K., who did?
Mama
Now daddy climbed it
Now mama
Mommy jumped off it
And the kid and this guy [Jane] **they skipped off it**

"Low Scriptedness" completion to the Rock Climbing story—Example from a 54-month-old
I don't know
You don't know what they do? What do they do about little Jane's hurt knee?
I don't know
She fell down and hurt her knee, huh?
Nods
So what happens in our story?
She goes to the hospital
O.K.
Moves mother over to the hurt girl
Where's she [the mother]? Is she at the hospital now?
Nods, moves father next to mother
I want the sister to be at school
O.K. Does anything else happen in our story?
Then her leg was better and they went back to the park

"Secure Script" completion to Monster in Bedroom story—Example from a 37-month-old
The mommy and the daddy get the monster out
And come on mommy
Brings mother to room
And, and, and the daddy turns out the light
Brings father to the room
And, and, let's see
What happens now

TABLE 2—*Continued*

There's no monster in your bed
It's just a little bitty blanket
See Susan
Holds blanket up to girl
That's not a monster
That's why
Just a little blanket see
See, this one
It is look
See, see I told you
And she gets back in bed
And she, I got the monster out
Mommy don't do that (mother accidentally falls over)
That's silly, mommy
Good night Susan
Good night
See you in the morning
O.K.

"Low Scriptedness" completion to Monster in Bedroom story—Example from a 37-month-old
They come in
And what do they do?
I don't know
What do they do about the monster in the room?
Go under
Can you show me what they do?
No
I don't know

"Secure Script" completion to the Spilled Juice story—Example from a 54-month-old
She [mother] **just cleans it up and says**
And pours some more in and says "If you spill this again no more, no more juice
And then he reaches over and gets it and he doesn't spill and he drinks it
And then he drunk it all up and he ate up all his food
And then he got down of his high-chair, this baby can get down of his high-chair
He got down of his high-chair
And then he went outside to play cause his dinner wasn't quite at night, it was at noon
And he shoveled and put grass in his bucket because there was some ants outside the xxx and mud and grass xxx went up and up the pail and if he brought it down the xxx they would die

"Low Scriptedness" completion to the Spilled Juice story—Example from a 54-month-old
Picks up cup
Picks up boy and throws him to other side of table
Did he go up to his room?
Yes, he flied like Superman
Wipe, wipe
Who's wiping it?
Mommy

[a] Child's verbalizations are in bold, E's are not, "xxx" means unintelligible verbalization.

interpretation of the spilled juice story would be to simply state the punishment (go to room or get spanked). For both interpretations, a poor ending was the standard failure to deal with the problem or an odd ending.

In all of these scenarios, the emphasis in the description of the prototypical attachment script was that of explanation and understanding. Thus, rock climbing does not always lead to injury. Monsters are not real, and if you check for them you discover they are not really there or are just a crumpled blanket, etc. Spilled juice is not a disastrous situation, but something that can be dealt with effectively so that you can get on with your dinner. Table 2 presents examples of highly scripted story completions as well as examples of story completions that lack coherence.

Once prototypical attachment script endings had been defined, two raters ranked the stories produced to each story stem at each age from most prototypical to least. The rankings were separate for the different scenarios and the different ages, producing a total of six scriptedness rankings. For each ranking procedure, a rater was asked to sort the stories according to a shell-sort ranking procedure described in Chignell and Patty (1987). Basically, the raters divided each group of stories into two piles, more scripted and less scripted, and continued with the procedure until all the stories in the pile were ranked in order from most to least scripted. This ranking procedure has been used previously in narrative production studies to assess typicality (or scriptedness) of story content (Waters, Hou, & Lee, 1993; Waters & Lee, 1994) and has produced high rates of agreement across raters. Agreement across the two raters for each of the story types at each age, assessed by correlating their ranking scores, was $r = .77, .75, .83$ for the Rock Climbing, Monster in Bedroom, and Spilled Juice stories, respectively, at 37 months of age and .86, .88, .79 for these three stories, respectively, at 54 months of age.

Rater scores for each story were averaged and then the ranked scriptedness scores for each of the three stories at the two ages were again averaged in order to produce a single scriptedness score at each age for each child. Because the scriptedness scores are rankings there cannot be any age differences in mean ranked scores and no across-age comparisons are made (the mean ranked scores at each age were 12.5, and the *SD*s were 5.2 at 37 months and 5.5 at 54 months). Table 1 presents the degree of similarity of scriptedness rankings across stories at each age as well as the α reliabilities of the averaged scriptedness scores that are used in the correlational analysis on attachment security and cognitive features of the story completions presented in the Results section.

As can be seen from the correlations at both ages, there is some variability in performance across different story completions, with the Monster in the Bedroom story somewhat less similar to the other two stories at both ages. This is not surprising given the evidence on content-specific effects in narrative production (Hudson & Shapiro, 1991). It should be noted, however, that the pattern of correlations is the same at both ages, indicating that the degree of variability is

comparable across ages. As a consequence, the α reliabilities at both ages for the averaged scriptedness scores are essentially equivalent, making it possible to interpret any developmental differences in terms of psychological processes rather than measurement differences due to differing effects of story topics.

Attachment security. The Q-sort security score of the children, assessed at 25 months, was selected as the measure of attachment security in the present study. The attachment Q-sort is a procedure for assigning scores to items within the areas of security, dependency, and sociability. Observers assign scores to each item in the set by sorting the items into nine piles, which range from most characteristic to least characteristic of the particular child. The score then assigned to each item is its placement within the piles, i.e., 1 to 9. The scores assigned to each item are then correlated with scores from an "ideal" secure child, with Q-sort data from children who fit the pattern of the prototypical secure child producing stronger correlations. Although Bretherton et al. (1990) reported multiple measures of attachment for their sample at more than one age, we chose the Q-sort scores at 25 months because the Q-sort at that age represented the most sensitive measure of attachment in the Bretherton et al. data, i.e., most strongly correlated with the Bretherton story security scores. The issue of how different measures of attachment are related to one another was not a question we addressed in the current cognitively based analysis.[1]

Other variables. In addition to the attachment security scores obtained from Bretherton et al. (1990), scores from the Bayley Test of Infant Development (Bayley, 1969) and a vocabulary checklist (Bretherton, McNew, Snyder, & Bates, 1983) at 25 months were also used in the correlational analyses presented in the Results. The purpose was to assess the discriminant validity of the cognitively based story measures. Bretherton et al. (1990) had reported significant positive correlations between their story security measure and the Bayley and vocabulary scores, indicating that they were in part measuring general cognitive functioning in the children.

Results

The first section presents the correlational analyses of the interrelationships among prototypic scriptedness, content elaboration, and attachment security. In the second section, the discriminant validity of the story variables vis-à-vis general cognitive and language functioning is evaluated. In the third, consistency

[1] The attachment Q-set has the advantage (over other measures of attachment) of being a quantitative variable with a greater numerical range and consequently greater sensitivity to individual variation. In addition, it is a more direct measure of naturalistic secure base behaviors that form the core of attachment security than the various laboratory assessments that are available. With regard to the Bretherton et al. (1990) data, we would also like to note that whereas the 25-month-olds' Q-sort data produced the strongest correlation with story security assessments, the 37-month-olds' Q-sort data produced only a very weak correlation. According to D. Ridgeway, the 37-month-olds' Q-sort data was less reliable because mothers completed the Q-sort on their own, without the assistance of a research assistant, as was the case with the earlier Q-sort at 25 months.

TABLE 3
Correlations among Scriptedness, Idea Units, Attachment Security, and Other Measures within and Across Ages

	Scriptedness	Idea units
37 Months		
Security	$r = .39$, $p < .03$	$r = .33$, $p < .06$
Bayley scores	$r = .17$, ns	$r = .26$, ns
Vocabulary	$r = .21$, ns	$r = .33$, $p < .06$
54 Months		
Security	$r = .41$, $p < .02$	$r = .45$, $p < .01$
Bayley scores	$r = .09$, ns	$r = -.13$, ns
Vocabulary	$r = .24$, ns	$r = .09$, ns
Composite Scores (37–54 months)		
Security	$r = .45$, $p < .01$	$r = .47$, $p < .01$
Bayley scores	$r = .10$, ns	$r = .01$, ns
Vocabulary	$r = .26$, ns	$r = .26$, ns
Across age		
Scriptedness	$r = .49$, $p < .01$	—
Idea units	—	$r = .38$, $p < .04$
Within age		
Scriptedness—37 months	—	$r = .82$, $p < .001$
Scriptedness—54 months	—	$r = .77$, $p < .001$

across ages for the two cognitively based story variables is evaluated. And finally, included in the last section is an assessment of the relations between the current cognitively based story measures and the Bretherton et al. (1990) security scores for the story completions.

Interrelationships among prototypical scriptedness, content elaboration, and attachment security. Correlations between prototypic scriptedness, content elaboration (the number of idea units), and attachment security at each age are presented in Table 3. Significance levels are established according to one-tailed tests because of the specific hypotheses concerning the relationships among the variables. In addition, Table 3 presents the correlations between the two cognitively based story completion variables and the Bayley and vocabulary checklist scores at each age. Finally, within- and across-age correlations between prototypical scriptedness and the number of idea units are also presented.

As predicted, attachment security is significantly correlated with the two cognitively based story completion variables at each age, with the correlations slightly higher at 54 months than at 37 months. This improvement, although not significant, is consistent with the expectation that some improvement in the correlations with age would occur as language development factors decrease as

potential confounding variables. In addition, the scores for each cognitive variable at each age were composited to produce a single score, with idea unit scores first transformed into *z* scores because of the significant age change in those scores.[2] These composite scores correlated .45 and .47 with attachment security for prototypical scriptedness and mean idea units, respectively. For these same children, the original global security score that Bretherton et al. (1990) assigned the stories correlates .54 with the 25 month Q-sort attachment scores.

Discriminant validity. Both the Bayley scores and the vocabulary checklist at 25 months shed some light on the question of whether performance on the story completions task might be due in part to differences in general cognitive and language functioning. As can be seen from the correlations in Table 3, Bayley scores are unrelated to either cognitive variable at either age, with the vocabulary checklist scores approaching significance only for the idea unit measure at 37 months. The composite scores for each cognitive variable also show no relationship to either Bayley or vocabulary checklist scores. Thus, the two cognitive measures appear largely independent of general cognitive and language functioning.

Correlations between attachment security and the two cognitive variables, with both the Bayley and vocabulary scores partialled out, support that interpretation. The partial correlations of the composite scores with security are .39, $p < .03$, for scriptedness and .42, $p < .02$, for idea units. Significance levels remain similarly intact examining just the data at 54 months, with partial correlations with security of .36 $p < .04$, and .49, $p < .01$, for scriptedness and idea units, respectively. At 37 months, where language skills were more likely to have a confounding role in assessment, the correlation between security and scriptedness remained close to significance, with a partial correlation of .33, $p < .06$. The partial correlation between idea units and security, however, dropped to .23, $p < .14$.

As noted earlier, in the Bretherton et al. (1990) study, both the Bayley and vocabulary checklist measures were highly correlated with the general security score given to each child for their story completions, .49 and .60, respectively. With respect to the subset of children used in the current sample, the correlation between the Bretherton et al. (1990) security scores and the Bayley scores is .62 and .61 with the vocabulary scores. Although partialing out Bayley and vocabulary scores from the correlation between the Bretherton scoring and the attachment security scores (Q-set data) also maintained a significant correlation (.45 versus .54 without partialing out the two cognitive/language variables), the Bretherton et al. (1990) story security scores still show significant overlap with these nonattachment variables. The resilience of the correlation when the cognitive/language variables are partialed out is primarily due to the independence

[2] Because scriptedness is a rank variable, both mean scriptedness scores and *SD*s at each age are equivalent (reported in earlier scriptedness section). Consequently there is no age effect and no need to partial out age. For the idea units variable, we used the *z* score transformation to, in effect, partial out age before we conducted the correlational analyses.

of attachment security as measured by the E. Waters attachment Q-set and the Bayley and vocabulary scores.

To summarize, the more formal, cognitively based variables evaluated in the present study map more closely onto theoretical expectations that attachment relevant stories should reflect individual differences in attachment representation and not general developmental differences. Whereas the Bretherton et al. (1990) story security scores correlate slightly more with attachment security (.54 versus .45 and .47), the current cognitive measures have the advantage of greater discriminant validity.

Across-age consistency. In addition to the predictions of interrelatedness between the two cognitive variables and security at each age, we also expected to see consistency across age. This third hypothesis was evaluated by correlating scores for each variable across the two ages. Once again, Table 3 presents the results. Significant correlations are found for both the prototypic scriptedness measure and the idea unit measure. It should also be noted that the two cognitive variables are highly correlated with each other at each age. This is undoubtedly due in part to the open-ended format of the story completion task. A more structured story production format is likely to produce more consistent levels of content elaboration across individuals and weaken such a relationship. Nonetheless, a strong relationship is not unexpected given the fundamental cognitive hypothesis that attachment scripts form the building blocks of attachment representation (Bretherton, 1991). More elaborated scripts should enable children to produce more detailed stories, and secure children should have more elaborated scripts.

Relations among story scoring systems and secure base behavior. The final step in the current analysis was to identify unique and common components of the overlap of Bretherton et al. (1990) and the Scriptedness–Idea Units scoring with the secure base behavior criterion (attachment Q-sort security scores). The issue was whether the Scriptedness–Idea Units scoring is more valuable for what it tells us about cognitive variables that are related to conventional scoring systems (i.e., the Bretherton et al. scoring) or whether it represents a source of additional information about attachment representation overlooked by conventional scoring systems.

In order to answer this question we performed a series of hierarchical multiple regression analyses. In the first step we computed the multiple correlation of Scriptedness–Idea Units and the Bretherton et al. (1990) scoring with Q-sort Security scores.[3] The multiple R was .58 ($p < .02$); the corresponding R^2 indicates that 34% of the variance in Q-sort Security scores is related to Scriptedness–Idea Units and the Bretherton et al.[4] In the second step of the

[3] As indicated above, the scriptedness and idea units variables are highly correlated. Therefore, they were z scored and summed to yield a single predictor variable for these analyses. This increases the statistical power of the analysis at little cost in predictive power.

[4] Note that, for a given set of predictors, the total R^2 is the same regardless of the order in which they are entered.

analysis, we used the Scriptedness–Idea units variable alone to predict Q-sort Security scores. The multiple R was .48 ($p < .02$); the corresponding R^2 indicates that 23% of the Security variance is shared with the Scriptedness–Idea Units variable. We then used the Bretherton et al. scores to predict the Q-sort Security scores. The multiple R was .54 ($p < .01$); the corresponding R^2 indicates that 29% of the Security variance is related to the Bretherton et al. scoring.

In both analyses, the predictors' overlap with Security is due to an independent (unique) component and a component which is redundant (common) with the other predictor. In the last step of this analysis we determined the magnitudes of the predictors' unique and common contributions to the total R^2. The unique contribution of the Bretherton et al. scores is equal to the total R^2 (.34) minus the R^2 for Scriptedness–Idea Units variable (.23); of the 34% overlap, 11% is uniquely attributable specifically to the Bretherton et al. scoring. The unique contribution of the Scriptedness–Idea Units scoring is equal to the total R^2 (.34) minus the R^2 for the Bretherton et al. scoring (.29); of the 34% overlap, 5% is uniquely attributable to the Scriptedness–Idea Units scoring. Neither unique component, however, is statistically significant. Nonetheless, it is an intriguing possibility that the Scriptedness–Idea Units scoring may be related to some (unique) secure base variance not captured by conventional scoring. This requires further investigation in studies with larger samples, a wider range of ages, and materials specifically designed for formal cognitive analysis before any firm conclusions can be drawn. The difference in stories that were scored (we omitted the two-part separation–reunion story from our analysis) might also be responsible for some of the unique variance. With regard to the redundant or common component of the total R^2, it is equal to the total R^2 minus the two unique components (34% − 11% − 5% = 18%). That is, 53% of the total R^2 relating the Bretherton et al. and Scriptedness–Idea Units scoring to Security is common variance. These results are represented graphically in Fig. 1.

Finally, it should be noted how the variance due to cognitive and language functioning fits within the schematic diagram presented in Fig. 1. The variance is not explicitly included because of the information processing load that would occur with too many circles, and the results do not directly bear on how secure base variance is accounted for. Nonetheless, the variance due to Bayley and vocabulary scores can be understood within the framework of the diagram. As can be seen from the correlations in Table 3, Bayley scores are essentially uncorrelated with the two cognitive variables and have only a weak correlation with security scores (.22 for the current sample). That would place the joint variance between the Bayley and the Bretherton scoring system ($r = .62$) outside the cognitive variables circle and largely outside the circle representing secure base behavior. The vocabulary scores also correlate highly with the Bretherton scoring system ($r = .61$). They do, however, correlate a bit more with the cognitive variables than the Bayley scores, but still at nonsignificant levels (see Table 3). Thus the joint variance between vocabulary scores and the Bretherton

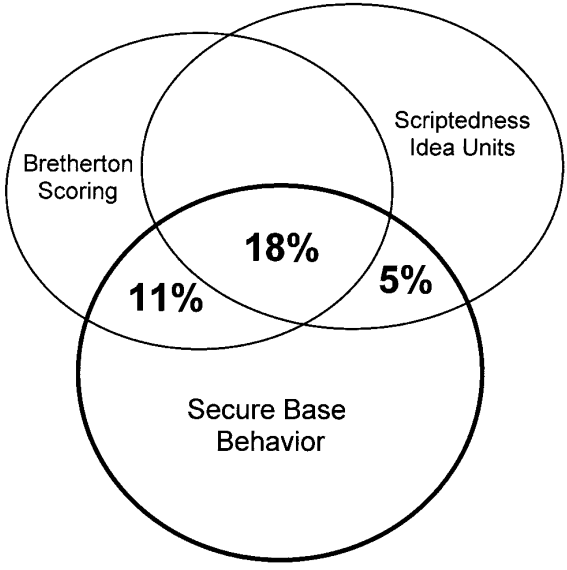

FIG. 1. Relations among story scoring systems and secure base behavior.

scoring also falls mostly outside the cognitive variables circle. With a correlation of .37 with security in the current sample, the overlap of the common variance with secure base behavior is somewhat greater than that for the Bayley scores. Nonetheless, similar patterns emerge for both Bayley and vocabulary scores placing their common variance with the Bretherton scoring largely outside both the cognitive variables circle and the secure base circle.

DISCUSSION

Children at both 37 and 54 months of age who had higher security scores produced more highly scripted stories that were also longer, providing greater detail to the unfolding storyline. These findings are consistent with a more formal cognitive hypothesis in which attachment representations in secure children are likely to be more highly scripted, more readily accessed, and more elaborated. They also fit well with findings in the script development literature in which scripts undergo a systematic elaboration with age and experience (Nelson, 1986). Furthermore, they indicate that cognitively based analyses of attachment–relevant stories are fruitful avenues for uncovering important correlates of attachment representations and, by inference, of possible mechanisms by which they are constructed. Attachment representations, i.e., working models, are said to emerge through everyday experiences, often involving parent–child communication and co-construction processes about significant attachment related themes.

Narrative assessments in young children offer our first glimpse into these processes.

The current findings also break new ground in establishing individual consistency in attachment representations across a 1-1/2-year time span, one in which there is a great deal of cognitive growth. In spite of general cognitive and language-based advances during this time period, the correlations between scores on the two cognitive variables across age were significant. Because Bretherton et al. (1990) only report story security scores for the 37-month-olds' sample, and publication of the 54-month-olds' data (Bretherton, Prentiss, & Ridgeway, 1990) did not include story security scores, this is the first report of across-age consistency in attachment representation for this sample.

In addition, the current findings establish discriminant validity for the current cognitively based narrative scoring of attachment representation. Neither of our two cognitive variables correlated significantly with scores from either the Bayley Test of Infant Development or the vocabulary checklist that was used in evaluating cognitive and language skill in the original sample. Thus, both the scriptedness measure and the idea unit measure represent distinct features of the stories and by inference of attachment representations and not general cognitive functioning. That is not to say that developmental effects are not evident in the measures. The average length of the story completions, for example, increases with age as would be expected if the attachment-relevant scripts are being elaborated over time. Also, the correlations between the measures and attachment security are weakened at the younger age when the general cognitive functioning variables are partialed out.

In contrast, however, Bretherton et al. (1990) reported significant correlations between story security scores and scores on the Bayley developmental assessment and the vocabulary checklist. Nonetheless, in spite of the specificity of the current analysis and the global nature of the Bretherton et al. (1990) analysis, scriptedness rankings and number of idea units were significantly correlated with the Bretherton et al. (1990) story security scores. It appears that a good deal of the variance accounted for by the Bretherton et al. (1990) scoring system is in fact due to the cognitive features we have identified in this article.

A key goal in attachment research is to better understand the mechanisms behind the individual differences in attachment representations. Two key steps in this are to understand how underlying attachment representations influence narrative structure in story production tasks and how they influence secure base behavior. Although scoring systems such as that developed by Bretherton et al. will remain useful in a wide range of research, the present study illustrates that research on narrative skills and cognitive development can make a significant contribution. This applies not only to research on attachment-related passages but also to the co-construction processes through which they are generated.

Without specific hypotheses of how co-construction leads to the development of attachment-relevant scripts and consequently attachment representations, this

research is likely to falter. Current scoring systems for assessing security from narrative protocols are more in tune with predicting the security of the child than they are about identifying those cognitive features that not only distinguish secure attachment representations from those of anxiously attached children, but might be amenable to the effects of co-construction. The current study at least provides a start in an opposite direction, one in which more specific cognitively based hypotheses are possible. As an example, the research conducted by Robyn Fivush and her colleagues on mothers' interactive styles and autobiographical memory (Fivush, 1991; Reese, Haden, & Fivush, 1993) suggests that elaborative processes can flow from mother to child, and the current results identify elaboration as a key feature of secure attachment representations. One of the most intriguing hypotheses is that the coherence we see in secure attachment representations is not simply a function of consistency in maternal behavior, but also a function of the mother's active communication about attachment-relevant issues and experiences.

In conclusion, the advantage of a more formally cognitively based analysis of attachment-relevant story productions is fourfold. First, the analysis and the results produced from it can be interpreted within a broader cognitive development literature, providing theoretical insights into the nature of attachment representation that would otherwise elude us. Second, the analysis is more focused, omitting features of production that are not related to representation per se. For example, secure children may interact more smoothly with the experimenter, responding more positively to experimenter prompts. That may be a secure child characteristic, but it is not a feature of attachment representation. Third, cognitive analyses such as the ones used in the present study are easy to implement, relatively objective, and produce positive results with much less effort than some of the complex and quite varied scoring systems now in place in the attachment literature on narrative assessment. And finally, and perhaps most important, identifying specific cognitive features of attachment–relevant narrative productions should enable researchers to take the research and the theoretical discussion to the next step where possible mechanisms of development can be fruitfully investigated.

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