Conservation as a predictor of individual differences in children's susceptibility to leading questions

JACQUELINE MUIR-BROADDUS, TAMARA KING, DINAH DOWNEY, and MARK PETERSEN
Southwestern University, Georgetown, Texas

The relationships between susceptibility to leading questions and several individual differences variables—namely number and mass conservation; self-rated social desirability; and teacher-rated assertive social skills, shyness-anxiousness, and acting out—were examined for 36 first graders. As predicted, children whose conservation skills were more advanced were least susceptible to leading questions. However, there was no reliable direct association with any of the four personality variables assessed. Results were interpreted as evidence that the ability to simultaneously consider multiple dimensions may be one general cognitive factor underlying developmental and individual differences in susceptibility to leading questions.

As the courts rely more and more on the testimony of children, especially in cases of child abuse, it is increasingly necessary to know how reliable children's memories really are (Portwood & Reppucci, 1996). Happily, children's memories *can* be sound. That is, in situations of nonleading, nonsuggestive, open-ended questioning, children's recollections tend to be brief but accurate, especially concerning central events (Cassel & Bjorklund, 1995; Cassel, Roebbers, & Bjorklund, 1996; Ceci & Bruck, 1993). The brevity of young children's recollections is due to the cue dependence of their memories. That is, children, like adults (although to a much lesser extent), have difficulty retrieving their memories without considerable support in terms of contextual cues (Bjorklund & Muir, 1988; Schneider & Pressley, 1989). It is just this cue dependence that leads to considerable recognition-based questioning (e.g., "Do you remember the white dog biting Jimmy?") both in the courts and out. And, it is just this form of questioning that seems most open to suggestibility effects (Brainerd & Reyna, 1996).

Although there is considerable evidence that leading questions can greatly influence children's responses (Cassel & Bjorklund, 1995; Ceci & Bruck, 1993; Portwood & Reppucci, 1996), little is known about why some children succumb to this and other forms of influence more readily than others (Bruck, Ceci, & Mèlnyk, 1997; Quas, Qin, Schaaf, & Goodman, 1997; Schacter, Kagan, & Leichtman, 1995). Indeed, modest but statistically reliable intraindividual consistency in performance across

various measures gives reason to adopt such a trait view of suggestibility (Leichtman & Morse, 1997; Tomes & Katz, 1997). The individual differences question has considerable practical significance. For example, whereas the developmental literature provides group means, guiding judges and jurors as to the likelihood and degree of suggestibility of the average child at a given age, even more helpful would be to predict the reliability of the *individual* child witness at hand.

Given that the various manifestations of suggestibility typically decrease with age, being especially high for preschoolers (Ceci & Bruck, 1993, 1995), contributors to individual differences in suggestibility may include individual variations in the attainment of one or more global or specific cognitive developmental milestones. Although the focus of their study was on developmental changes rather than individual differences, Welch-Ross, Diecidue, and Miller (1997) examined the role of one such factor: developmental advances in children's understanding of conflicting mental representations (CMRs). The rationale for their study was that preschoolers have a "copy theory" of mind that assumes a correspondence between reality and mental representations of reality, whereas older children have a "representational theory" of mind that acknowledges that one's representations of reality may vary with available information. Age-related advances in appearance-reality and false-belief task performance, they argued, reflect this underlying conceptual difference. With respect to suggestibility, Welch-Ross et al. pointed out

that the tendency of young preschoolers to maintain a single representation of the way the world is may prohibit them from simultaneously considering their original event memory and their memory of misleading information. Thus, the inability to understand and reason about CMRs may contribute to what only appears to be an overwriting of the original event detail in storage after the child has been exposed to conflicting, postevent information. (p. 45)

This research was made possible by the participation of the staff and students at Annie Purl Elementary School, Georgetown, Texas. Portions of this work were presented at the meeting of the Southwestern Psychological Association, Fort Worth, Texas, April 1997. Correspondence should be addressed to J. Muir-Broadbudd, Departments of Psychology and Education, Southwestern University, Georgetown, TX 78627-0770 (e-mail: muirbroj@southwestern.edu).

In support of their predictions, Welch-Ross et al. found convincing evidence that developmental advances in children's understanding of CMRs are, in fact, accompanied by age-related declines in suggestibility among 3- to 5-year-olds.

Whereas Welch-Ross et al. (1997) focused on developmental changes across the 3- to 5-year-old age range, there is reason to examine the cognitive changes that occur in the next age range as well—that is, as children make the transition from preoperations to concrete operations. Indeed, numerous studies have revealed group differences in suggestibility at this time. To cite just a few recent examples, there is evidence that the false memory creation effect is greater for 5- than for 8-year-olds (Brainerd & Reyna, 1996), that the likelihood of accepting a suggestion about being touched on the leg decreases between the ages of 4 and 6 years (Portwood & Reppucci, 1996), and that first graders are more likely than third or fifth graders to erroneously claim that suggested items have actually been seen (Ackil & Zaragoza, 1995). In fact, Portwood and Reppucci specifically articulated the possibility of “a threshold age—approximately 4½ years—after which children's suggestibility begins to diminish” (p. 192).

Conservation, one of the hallmarks of the transition from preoperations to concrete operations, was identified as a promising cognitive milestone by Schacter et al. (1995). That is, conservation requires one “to relate two events and appreciate the complementary relation between an event and the context in which it occurs” (p. 422), just as suggestibility may involve “separating what was actually experienced in the past—the background event—from the thoughts and ideas that are generated by the suggestions of others” (p. 423). In other words, they speculated that one reason why young children may succumb to suggestive influences is that they have difficulty relating an earlier event (what was actually experienced) with a present event (the suggestions of others), just as young children fail conservation tasks in which they must relate an earlier event (in which two sets of objects were equal) with a present event (in which one takes a different form). In both cases, the child is required to correctly relate what occurred previously with what is happening and is known at the present. Extending this argument to the specific case of leading questions, leading questions generate thoughts and/or images in the present that must be reconciled with the thoughts and/or images that are recollected from the previously experienced event. To date, however, we have found no evidence that the relationship between conservation and susceptibility to leading questions (or any other manifestation of suggestibility, for that matter) has been tested empirically.

Another possible contributor to individual differences in suggestibility is individual variations in personality. Although research in the area of personality correlates is still in its infancy, preliminary evidence suggests relationships between suggestibility and, to name a few examples, children's self-esteem and dependency (see re-

view by Bruck et al., 1997), adults' empathy (Tomes & Katz, 1997), and dissociation and imaginativeness for both children and adults (see review by Quas et al., 1997). Schacter et al. (1995) also speculated about the role of variations in temperament, citing inhibition as a likely candidate. That is, just as highly reactive-inhibited children are less likely to question or refuse an experimenter's request, inhibited children similarly may be more likely to conform to adult suggestions about a past event than a less inhibited child. We speculated that the related personality characteristics of low assertiveness, low acting out, and high shyness might affect the likelihood of responding affirmatively to leading questions. In support, research with adults has revealed that interrogative suggestibility is moderately correlated with low assertiveness (Gudjonsson, 1988). Another possible personality variable, social desirability, has produced mixed results (Gudjonsson, 1983; Quas et al., 1997), although we concur with past theorizing that the desire to please should also affect the likelihood of responding affirmatively to leading questions.

The purpose of the present experiment, then, was to explore the relationships among susceptibility to leading questions, global cognitive development (conservation), and personality (social desirability, assertive social skills, shyness-anxiousness, and acting out) among 6-year-olds, an age chosen because it should encompass adequate variability in the attainment of conservation.

METHOD

Participants

Thirty-six first graders from three classrooms in one elementary school agreed to participate in the study. All children were between the ages of 6.17 and 7.08 years (M age = 6.66, SD = .30). The 19 girls and 17 boys included 31 Caucasians, 4 Hispanics, and 1 African American.

Measures

Comprehensive Social Desirability Scale for Children. Twenty-five of the items from Walsh, Tomlinson-Keasey, and Klieger's (1974) scale were orally administered to each child individually (three items were deemed age inappropriate or dated and thus were omitted). Walsh et al. reported an alternate form reliability of .91 and correlations of .36 and .81 with two other published measures of social desirability. Example questions include the following: “Do you tease people?” “Are you friendly?” and “Are you polite?” A high score indicates high social desirability.

Piagetian number and mass conservation task. In the number conservation portion of the task, the interviewer placed a row of six “Pogs” (popular disk-shaped playing pieces) on a table in front of each child. The interviewer then asked the children to pick six more Pogs out of a cup and place them in a row directly underneath the experimenter's row. The children were asked if both rows were equal and to explain their reasoning. The interviewer then spread out the row of Pogs and asked, “Do the two rows still have the same amount of Pogs, or does one row have more or does the other row have more?” This was followed by, “Why do you think so?”

Scoring was based on the stages described in Bjorklund (1995). That is, children were assigned 0 points if they could not match the experimenter's row of Pogs. They were assigned 1 point if they could lay out the correct number of Pogs, but when one row was elongated they stated that the elongated row had more Pogs or that they did not know which row had more Pogs. Children were assigned 2 points if they correctly stated that both rows were the same even if one was elongated, but they

could not give a satisfactory explanation as to why, and 3 points if they stated that both rows had the same amount of Pogs and also gave a satisfactory explanation as to why.

In the mass conservation portion of the task, the children were shown two balls of Play-Doh and asked to adjust the balls until they felt that both balls were equal. The interviewer then rolled one of the balls into a log and asked, "Do the two balls still have the same amount of Play-Doh, or does one ball have more or does the other ball have more?" This was followed by, "Why do you think so?" The scoring was similar to that of the number conservation task. Children were assigned 0 points if they could not ascertain that the two balls of Play-Doh initially contained the same amount. Children were assigned 1 point if they determined that the two balls of clay contained the same amount, but stated that the elongated Play-Doh contained more or that they did not know which contained more. Children were assigned 2 points if they correctly stated that both the round and elongated forms of Play-Doh had the same amount, but they were unable to give a satisfactory explanation as to why, and 3 points if they correctly stated that both the round and elongated forms of Play-Doh had the same amount and also gave a satisfactory explanation as to why.

Susceptibility to leading questions. The children were asked orally if they remembered each of nine events from the first session. Three of the events had actually occurred—"Do you remember putting the Pogs in a row?" (1), "... me asking you which of two pictures you liked the best?" (4), and "... you picking some Pogs out of a cup?" (7). Six of the questions were about events that had not occurred—"Do you remember the Pogs falling on the floor?" (2), "... me showing you some marbles?" (3), "... me asking if you had any brothers or sisters?" (5), "... us sitting on the floor?" (6), "... a teacher coming up and interrupting us?" (8), and "... me tripping and falling when I came into your classroom?" (9). The numbers in parentheses indicate the order in which the questions were asked.

Teacher-Child Rating Scale. Three of the subscales (assertive social skills, shyness-anxiousness, and acting-out) of the *Teacher-Child Rating Scale* (Hightower et al., 1986) were administered. Cronbach's alpha for the three subscales ranges from .85 to .94, and test-retest reliability ranges from .61 to .90. Hightower et al. also demonstrated adequate construct, criterion-related, and convergent validity. Example items for each of the subscales, respectively, are "defends own views under group pressure," "does not express feelings," and "disruptive in class." Ratings for each item were made on a 5-point scale ranging from 1 (*not true at all*) to 5 (*very true*). The range of possible scores was 7–35 for assertive social skills (7 items), 6–30 for shyness-anxiousness (6 items), and 6–30 for acting out (6 items).

Procedure

The children were tested individually by one of three researchers during two short sessions scheduled 1 week apart. In the first session, the children completed the *Comprehensive Social Desirability Scale for Children* and the Piagetian number and mass conservation tasks. During the second session, the interviewers assessed susceptibility to leading questions by asking questions about what had occurred during the first session. Each child's teacher completed the *Teacher-Child Rating Scale* at her leisure.

RESULTS

The simple correlations among all variables are shown in Table 1.

Susceptibility to Leading Questions

Responses to the six questions about events that had *not* actually occurred showed that our leading questions were effective in eliciting a respectable amount of and variability in false recognitions ($M = 1.58$, $SD = 1.38$). The foil questions varied in how hard they were to reject. Specifically, of the 36 children, 12 erroneously responded

Table 1
Simple Correlations Among All Variables ($N = 36$)

	1	2	3	4	5	6	7
1. Susceptibility to leading questions							
2. Age	-.25						
3. Accuracy	-.12	-.04					
4. Conservation	-.60*	.20	.24				
5. Social desirability	-.31	-.11	.05	.28			
6. Shyness-anxiousness	.19	.00	-.36*	-.08	.11		
7. Assertive social skills	-.37*	.26	.32	.40*	-.04	-.67*	
8. Acting out	-.01	.04	-.11	-.05	-.32	-.28	.42*

* $p < .05$.

affirmatively to Question 2, 14 to Question 3, 29 to Question 5, 9 to Question 6, 4 to Question 8, and 5 to Question 9 (also, 2 children responded "maybe" to Question 5 and 1 to Question 9). Note that Question 5 ("Do you remember me asking if you had any brothers or sisters?") was overwhelmingly misrecognized, perhaps because such a question is highly consistent with children's schemas for the kinds of questions asked by strangers (see Quas et al., 1997 for a discussion of the positive and negative effects of prior knowledge on memory and suggestibility).

In order to show that our measure was not simply assessing the accuracy of children's memories for the event itself, we analyzed whether the likelihood of recognizing an actual event was related to the likelihood of falsely recognizing a foil. Although accuracy for the three questions about events that *had* occurred was at ceiling levels ($M = 2.94$, $SD = .48$), limiting the sensitivity of this analysis, it is nevertheless important to establish that no reliable relationship emerged between the likelihood of *accurately* affirming that an event had occurred and the likelihood of *erroneously* affirming that an event had occurred (susceptibility to leading questions).

Susceptibility to Leading Questions and Conservation

Scores for the number and mass conservation tasks were summed to determine an overall conservation score. All protocols were independently scored by all three testers; after two scoring discrepancies were resolved through discussion, there was 100% agreement. The mean score was 3.83 ($SD = 1.42$, range = 2–6) out of a possible 6 points.

As predicted, children who were more susceptible to leading questions scored lower on the conservation tasks. Given the possibility that this relationship was simply an artifact of minor maturational differences between the children who had recently turned 6 years of age and those who had recently turned 7, we examined the correlation between susceptibility to leading questions and age (rounded off to the nearest month). It was not significant. Although this failure to find an effect of minor variations in age does not eliminate the possibility that some general (or specific) maturational factor other than conservation was at work here, neither do these data suggest that this was the case.

Susceptibility to Leading Questions and Personality

The children were moderately high in self-rated social desirability, with little variability ($M = 17.83$, $SD = 2.17$). There was, however, greater variability in the teacher ratings of assertive social skills ($M = 21.72$, $SD = 7.33$), shyness-anxiousness ($M = 13.25$, $SD = 6.09$), and acting out ($M = 14.86$, $SD = 7.15$).

Only one of the four personality dimensions, assertive social skills, was significantly related to the children's susceptibility to leading questions. There were no reliable relationships, however, between susceptibility to leading questions and shyness-anxiousness, acting out, or social desirability.

Regression Analysis of All Variables

Given the intercorrelations among some of the variables, a multiple regression analysis was performed in which conservation, assertive social skills, social desirability, age, accuracy, shyness-anxiousness, and acting out were entered in the order named. The model was a significant predictor of susceptibility to leading questions [$F(7,28) = 3.22$, $MS_e = 1.32$, $p < .02$], accounting for 45% of the variance. An assessment of each predictor variable's regression coefficients for independent contributions revealed that only conservation ($t = -2.92$, $p < .01$) made a statistically significant contribution to the model ($p > .17$ for all other predictors).

DISCUSSION

These results provide evidence to support Schacter et al.'s (1995) speculation that there might be a connection between two behaviors as seemingly different as susceptibility to leading questions and conservation, the logic being that individual differences in both may involve the ability to correctly relate an earlier event with a present event. This finding converges with those of Welch-Ross et al. (1997), who showed that accurate reasoning about CMRs predicts suggestibility. If suggestibility does indeed reflect a difficulty in dealing with multiple dimensions (memories for what actually occurred in the past and the thoughts generated by the suggestions of others in the more recent past or present), then other forms of reasoning that require the consideration of multiple dimensions should be predictive of suggestibility as well. Thus, future research should confirm and extend these findings using additional tasks. For example, the 5-year-old's tendency to consider only one dimension and the 8-year-old's ability to consider multiple dimensions may also underlie developmental advances as varied as seriation and moral reasoning, to name just two (Siegler & Ellis, 1996). Moreover, it is essential to compare performance on such tasks with performance on equally challenging tasks that do not involve the consideration of multiple dimensions to confirm that something more than global cognitive developmental status, or some other mechanism, is being assessed.

Such confirmations are particularly important given that alternative interpretations of performance on conflicting information tasks have been offered. That is, as Quas et al. (1997) pointed out,

It is possible that the children in Welch-Ross and colleagues' studies who were unsuccessful on the dual representation tasks may still have remembered both the original and suggested story information, but their increased suggestibility, like their failures on the dual representation tasks, was due to reliance on verbatim memory traces rather than gist memory traces. ... Clearly additional research is needed. (p. 364)

Given that the same challenge could be leveled at the interpretation of our conservation data, we echo the call.

Moreover, to take the issue to the next level of analysis, developmental and individual differences in basic capacities such as working memory, already shown to contribute to some of the above-named Piagetian phenomena (Case, 1985), may similarly contribute to developmental and individual differences in suggestibility. And, it is very likely that there are other cognitive status indicators that do not involve multiple dimensions at all, but that nevertheless also predict suggestibility. Thus, the present study encourages the continued search for the precise cognitive mechanisms that contribute to both individual and developmental differences in the various manifestations of suggestibility.

As for individual differences in personality, the results of the present study might best be described as inconclusive. It is possible that at least some of the null effects obtained in the present study may be artifacts of factors such as inadequately sensitive measures, and in the case of social desirability, inadequate variability in the children, their self-ratings, or both. At the same time, it also bears speculating as to the meaning of the unexpected association between assertive social skills and conservation, which, when controlled statistically, caused the predicted association between assertive social skills and susceptibility to leading questions to disappear. Work by Winer and his colleagues (e.g., Winer & McGlone, 1993) may be instructive in that they found performance on conservation tasks to be *itself* quite suggestible. That is, when asked conservation questions of the type, "Who has more, you or I?" (without being given the third option "Or do we both have the same?") as they did in their control condition and as we did in the present study, even adults often give a nonconservation response. Although one can only speculate, it is possible that in the present study assertive social skills played a role in affecting the children's willingness to discount perceptual information and/or any subtle demand characteristics of the conservation task in favor of their reasoning as to what must logically be true. In any case, if Winer and McGlone are correct in arguing that "Piagetian rule-based understanding might be more influenced by suggestibility than is memory for semantic information" (p. 768), then perhaps the possibility that conservation tasks tap the simultaneous consideration of multiple dimensions is only *one* reason why they hold promise as a metric for assessing individual differences in suggestibility. Moreover, if suggestibility reflects the interaction of both cognitive and personality variables, future research efforts might be more fruitful if *both* are included in the same paradigms.

REFERENCES

- ACKIL, J. K., & ZARAGOZA, M. S. (1995). Developmental declines in eyewitness suggestibility and memory for source. *Journal of Experimental Child Psychology*, **60**, 57-83.
- BJORKLUND, D. F. (1995). *Children's thinking: Developmental function and individual differences*. Pacific Grove, CA: Brooks/Cole.
- BJORKLUND, D. F., & MUIR, J. E. (1988). Children's development of free recall memory: Remembering on their own. In R. Vasta (Ed.), *Annals of child development* (Vol. 5, pp. 79-123). Greenwich, CT: JAI.
- BRAINERD, C. J., & REYNA, V. F. (1996). Mere memory testing creates false memories in children. *Developmental Psychology*, **32**, 467-478.
- BRUCK, M., CECI, S. J., & MELNYK, L. (1997). External and internal sources of variation in the creation of false reports in children. *Learning & Individual Differences*, **9**, 289-316.
- CASE, R. (1985). *Intellectual development: A systematic reinterpretation*. New York: Academic Press.
- CASSEL, W., & BJORKLUND, D. F. (1995). Developmental patterns of eyewitness memory and suggestibility. *Law & Human Behavior*, **19**, 507-532.
- CASSEL, W., ROEBERS, C., & BJORKLUND, D. F. (1996). Developmental patterns of eyewitness responses to repeated and increasingly suggestive questions. *Journal of Experimental Child Psychology*, **61**, 116-133.
- CECI, S., & BRUCK, M. (1993). Suggestibility of the child witness: A historical review and synthesis. *Psychological Bulletin*, **113**, 403-439.
- CECI, S., & BRUCK, M. (1995). *Jeopardy in the courtroom: A scientific analysis of children's testimony*. Washington, DC: American Psychological Association.
- GUDJONSSON, G. H. (1983). Suggestibility, intelligence, memory recall, and personality: An experimental study. *British Journal of Psychiatry*, **142**, 35-37.

- GUDJONSSON, G. H. (1988). Interrogative suggestibility: Its relationship with assertiveness, social-evaluative anxiety, state anxiety and method of coping. *British Journal of Clinical Psychology*, *27*, 159-166.
- HIGHTOWER, A. D., WORK, W. C., COWEN, E. L., LOTYCZEWSKI, B. S., SPINELL, A. P., GUARE, J. C., & ROHRBECK, C. A. (1986). The Teacher-Child Rating Scale: A brief objective measure of elementary children's school problem behaviors and competencies. *School Psychology Review*, *15*, 393-409.
- LEICHTMAN, M. D., & MORSE, M. B. (1997, April). Individual differences in preschoolers' suggestibility: Identifying the source. In J. A. Quas & G. S. Goodman (Chairs), *Individual differences in children's memory and suggestibility: New research findings and directions*. Symposium conducted at the meeting of the Society for Research in Child Development, Washington, DC.
- PORTWOOD, S. G., & REPPUCCI, N. D. (1996). Adults' impact on the suggestibility of preschooler's recollections. *Journal of Applied Developmental Psychology*, *17*, 175-198.
- QUAS, J. A., QIN, J., SCHAAF, J., & GOODMAN, G. S. (1997). Individual differences in children's and adults' suggestibility and false event memory. *Learning & Individual Differences*, *9*, 359-390.
- SCHACTER, D. L., KAGAN, J., & LEICHTMAN, M. D. (1995). True and false memories in children and adults: A cognitive neuroscience perspective. *Psychology, Public Policy, & Law*, *2*, 411-428.
- SCHNEIDER, W., & PRESSLEY, M. (1989). *Memory development between 2 and 20*. New York: Springer.
- SIEGLER, R. S., & ELLIS, S. (1996). Piaget on childhood. *Psychological Science*, *7*, 211-215.
- TOMES, J. L., & KATZ, A. N. (1997). Habitual susceptibility to misinformation and individual differences in eyewitness testimony. *Applied Cognitive Psychology*, *11*, 233-251.
- WALSH, J. A., TOMLINSON-KEASEY, C., & KLIEGER, D. M. (1974). Acquisition of the social desirability response. *Genetic Psychology Monographs*, *89*, 241-272.
- WELCH-ROSS, M. K., DIECIDUE, K., & MILLER, S. A. (1997). Young children's understanding of conflicting mental representations predicts suggestibility. *Developmental Psychology*, *33*, 43-53.
- WINER, G. A., & MCGLOONE, C. (1993). On the uncertainty of conservation: Responses to misleading conservation questions. *Developmental Psychology*, *29*, 760-769.

(Manuscript received July 23, 1997;
revision accepted for publication January 5, 1998.)