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Developmental Change in Perceived Control: Recognizing Noncontingency in the Laboratory and Perceiving It in the World

John R. Weisz
University of North Carolina at Chapel Hill

To study developmental change in an important component of perceived control, children's contingency judgments were examined with respect to totally uncontrollable outcomes (drawing cards blindly from a shuffled deck). Kindergarteners perceived outcomes as contingent, that is, they regarded competence-related factors (age, practice, intelligence, and effort) as significantly affecting outcomes, and they interpreted extremely high or low levels of success as evidence of high or low concentration or other competence-related attributes. By contrast, fourth graders identified the outcomes as resulting from luck and downplayed the role of competence-related factors. However, even fourth graders regarded such factors as *somewhat* relevant to outcomes, and their contingency judgments on the card task correlated .61 ($p < .01$) with their Just World questionnaire responses. The results suggest that illusory contingency declines with age, that even fourth graders are surprisingly susceptible to mistaken perceptions of contingency, and that their degree of susceptibility is related to their perceptions of contingency or justice in the world at large.

There was a mighty tempest in the sea, so that the ship was like to be broken. Then the mariners were afraid. . . . And they said. . . . Come, and let us cast lots, that we may know for whose cause this evil is upon us. So they cast lots, and the lot fell upon Jonah. (Jonah 1:4–7)

The belief that natural phenomena can be caused by human behavior and that chance events may not *really* be sheer vagary was not confined to Jonah's era. Even today subtle signs of such beliefs can be found among both children (see Piaget, 1976) and adults (see Langer, 1977). These beliefs are examples of illusory perceived contingency between outcomes and people's behavior. Perceived contingency, the subject of the present study, is a central component of perceived control. For an individual to control a class of outcomes, two conditions must exist: (a) Outcomes must be contingent on variations in people's behavior—a noncontingent outcome is inherently uncontrollable, and (b) the individual must be competent to produce the behavior on which the desired outcomes are contingent. Mistaken controllability judgments can result from faulty reasoning about either contingency or competence (for details, see Weisz & Stipek, Note 1).

Such mistaken judgments can have unfortunate effects, including ill-fated attempts to influence noncontingent outcomes (cf. Langer, 1977) and inappropriate losses in self-esteem following uncontrollable failure (cf. Seligman, 1975). Moreover, people who incorrectly perceive another's adverse outcomes as contingent may unfairly blame the victim (see Lerner, 1977).

Given the significant consequences of

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Requests for reprints should be sent to John R. Weisz, Department of Psychology, University of North Carolina, Davie Hall 013A, Chapel Hill, North Carolina 27514.

mistaken contingency judgments, it is important to understand how such judgments change as people mature. Theory and evidence on causal reasoning (e.g., Piaget, 1976) suggest that far from making random errors, young children generally overestimate contingency between outcomes and people's behavior, and that illusory contingency declines as children mature.[1] Yet, much of the Piagetian evidence is anecdotal, from *methode clinique* interviews. Controlled laboratory research with adults raises questions about Piaget's view. The research on adults (see Langer, 1977) indicates that illusory contingency is most pronounced when skill or competence cues are present. Illusory contingency induced by competence cues should be most likely in persons able to associate the cues with contingent outcomes, and this ability probably increases as children mature. So the power of competence cues to induce illusory contingency in certain situations may *increase* as children develop.

The present study was designed to assess developmental change using a controlled laboratory task. Kindergarten and fourth-grade children drew cards blindly from a deck to win chips. Afterward, they assessed the degree to which these noncontingent outcomes were contingent on variations in children's behavior. The study was also designed to assess self-serving biases. Research with adults (e.g., Wortman, Costanzo, & Witt, 1973) has identified apparent bias in causal attribution, with self-attributions made for favorable outcomes and external attributions made for unfavorable outcomes. Whereas most of these studies have involved explanations of personal outcomes, the present focus on contingency, independent of personal competence, required that children with either high or low winnings make judgments about the performance of others. A third purpose was to assess the relationship between perceptions of contingency on the card task and more generalized beliefs about contingency, or justice, in everyday life. To this end, children were also given a questionnaire designed to assess such generalized "just world" beliefs.

Method

Subjects and Experimental Design

The 2 (grade level) × 2 (winnings) factorial design involved 22 kindergarteners and 23 fourth graders from a predominantly upper-middle-class public school. In the five trials of the card task, 11 of each age won four chips, and 11 kindergarteners and 12 fourth graders won one chip. The number of boys and girls in each cell did not differ by more than two.

Procedure

Each child, seen individually, sat at a table opposite a 21-year-old female experimenter (who had not been told any hypotheses). She invited the child to play "a game that's a lot like Candyland" (a chance-controlled children's game). Asked whether they had played Candyland, 16 children in each age group said they had.

Twenty white 3 in. × 5 in. (7.62 × 12.7 cm) cards were spread out in front of the child, 10 with a blue spot on one side, 10 with a yellow spot. The child counted out 5 yellows, and 5 blues, and the child and adult mixed these 10 cards thoroughly. Asked how many yellows and how many blues were in this mixed stack, all children answered correctly. The experimenter lined five poker chips up in front of the child; she explained that the child would draw cards from the deck, would win a chip for each yellow card drawn (blue for half the children), and at the end would win a prize "if you have won enough chips." After each draw the card was returned to the deck, and the deck was reshuffled. The experimenter controlled winnings by using two 10-card decks—one with all blue spots, one with all yellow—that lay just out of the child's line of vision in an open briefcase. The procedure worked smoothly and evoked no signs of suspicion from any child. (After the fifth trial, the child gave a pride rating by pointing to one of several line drawings of faces showing various degrees of pride. Since this measure does not bear directly on the questions addressed in this study, it will not be discussed further.)

Predicted winnings. After the five trials, the experimenter lined up two new rows of five chips each. The child was asked to move as many chips out of one row as he/she thought "most kids older than you" would win, given five trials. Using the second row, a prediction was made for "most kids younger than you."

Next the child was asked three less structured perceived contingency questions. In one, the experimenter asked what she should say to a child who "asked me how to be *sure* to pick the right card *every* time." Next the child was asked to explain why another child

[1] Not reviewed here is a body of work on children's knowledge about chance (e.g., Piaget & Inhelder, 1975). This work has been omitted because it deals primarily with children's awareness of rules of probability.

Table 1
Perceived Contingency and Noncontingency on Two Minimally Structured Questions

Question	Grade	Perceived noncontingency	Perceived contingency
Why did a (fictitious) child pick the *wrong* color every time?	Kindergarten	0	9
	4th	11	6
Why did a (fictitious) child pick the *right* color every time?	Kindergarten	0	12
	4th	15	3

Note. For both questions, $p < .01$ (two-tailed Fisher exact tests).

who had played the game "didn't win even one chip," and why yet another child "won five chips—he/she got the right color every time." Then, using two rows of five chips each, the child predicted the winnings of (a) a child who "got to practice lots of times before trying to win chips" versus one who "didn't get to practice picking the cards at all"; (b) a child who "was very careful and tried very hard to pick the yellow cards and win chips" versus one who "didn't try very hard at all—he/she picked cards very quickly and did not seem to care what color he/she got"; and (c) a child who "was very smart" versus one who "was not very smart." The order of the questions was randomized across subjects. Finally, children were given additional trials to insure minimum winnings of three chips and then were awarded prizes.

Just World questionnnaire. About 4 weeks later, a 20-year-old female experimenter (uninformed as to hypotheses or children's previous performance), individually administered the 10-item children's Just World questionnaire. Questions all concerned whether everyday events are contingently related to people's behavior. The questions were randomly ordered for each child. Just World beliefs were indicated by a "yes" on 5 of the questions (e.g., "Do good things usually happen to nice people?") and by a "no" on 5 (e.g., "Do robbers often steal things without getting caught?"). Over all 45 subjects, the Spearman-Brown split-half reliability was .46 ($p < .01$).

Results

Preliminary analyses revealed no sex effects on any of the measures.

Evidence of Perceived Noncontingency on Unstructured Questions

Responses to the three unstructured questions were categorized as not codable (e.g., no answer, "I don't know"), perceived noncontingency (e.g., "It's just luck."), or perceived contingency (e.g., instructing the child who wants to win to "think real hard."). Using this scheme, two independent raters showed better than 90% concordance on all three questions. Responses that were not codable were about three times as frequent among kindergarteners as among fourth graders. Since this means that more kindergarteners than fourth graders were excluded from these analyses, findings with the unstructured questions should be interpreted with caution.

Responses to the question about the child who wanted "to pick the right card every time" yielded no significant findings. As Table 1 reveals, the other two questions evoked striking effects of grade level. On both questions not one kindergartener's response reflected a belief in noncontingency. By contrast, most fourth graders gave noncontingency explanations. Both questions revealed a trend toward self-serving bias, in that children who won one chip gave noncontingency answers more often than contingency answers, whereas children winning four chips showed the reverse pattern. This trend, however, approached significance only on the question about the child who lost every time (Fisher's exact test $p < .10$).

Structured Questions—ANOVAs on Magnitude of Perceived Effects

Structured paired-comparison questions were first analyzed using a 2 (grade) × 2 (winnings) × 4 (content—i.e., age vs. practice vs. intelligence vs. effort) repeated measures analysis of variance (ANOVA), with content as the trial factor. The dependent variables were difference scores (e.g., prediction for old minus young child). There was a significant grade effect, with bigger difference scores for kindergarteners ($M = 2.10$) than for fourth graders ($M =$

1.19), $F(1, 41) = 7.02$, $p = .01$; a Grade × Content interaction, $F(3, 123) = 4.18$, $p < .01$; and a Grade × Winnings × Content interaction, $F(3, 123) = 3.77$, $p = .01$. One way of examining the Grade × Content interaction was to ask whether the pattern of content area means in fourth graders differed from the pattern in kindergarteners. Tukey's honestly significant differences (HSD) tests revealed that no pairs of means from the four content areas differed significantly among fourth graders, nor were any pairwise comparisons significant for kindergarteners. As the next step in examining both the Grade × Content and the Grade × Content × Winnings interactions, separate ANOVAS were computed for each of the four content areas.

Age. Data from the age questions were subjected to a 2 (grade) × 2 (winnings) × 2 (older vs. younger) repeated measures ANOVA, with older versus younger as trial factor. A significant effect of older versus younger, $F(1, 41) = 52.07$, $p < .001$, revealed that subjects expected the older child to win more chips ($M = 4.13$ and 2.76, respectively). But a Grade × Older versus Younger interaction revealed that kindergarteners expected a bigger difference ($M = 1.82$) than did fourth graders ($M = .96$), $F(1, 41) = 4.99$, $p < .05$. Tukey's HSD test revealed that kindergarteners predicted significantly higher winnings for the older than the younger child ($p < .05$), but that fourth graders did not.

Practice. The next ANOVA revealed that a child having practice was expected to win more chips than a child having no practice ($M = 4.07$ and 2.44, respectively), $F(1, 41) = 41.47$, $p < .001$. A Trial × Grade interaction revealed that the difference predicted by kindergarteners ($M_{diff} = 2.27$) was more pronounced than that predicted by fourth graders ($M = 1.00$), $F(1, 41) = 6.17$, $p < .05$. Kindergarteners predicted significantly higher winnings for a child with practice than for one without (HSD test, $p < .05$); fourth graders did not. A Trial × Grade × Winnings interaction revealed that among fourth graders the predicted practice versus no practice difference was similar for one- and four-chip children ($M = .83$ and 1.18, respectively), but that among kindergarteners one-chip children predicted a greater difference (3.36) than did four-chip children ($M = 1.18$), $F(1, 41) = 6.17$, $p < .05$. The only significant practice versus no practice difference was found among the one-chip kindergarten group ($p < .05$), children for whom lack of practice might be used to explain away low winnings.

Intelligence. A significant effect of the trial factor on the intelligence question data revealed that predicted winnings were higher for a smart child than for one who was not, $F(1, 41) = 67.80$, $p < .001$ ($M = 4.16$ and 2.33, respectively). A Trial × Grade interaction indicated that this difference was more pronounced for kindergarteners ($M_{diff} = 2.68$) than for fourth graders (1.06), $F(1, 41) = 12.32$, $p < .001$. The smart–not smart difference was significant for kindergarteners ($p < .05$) but not for fourth graders.

Effort. The effort questions, expected to create the most powerful aura of contingency, were apparently powerful enough to erode the sophistication shown by fourth graders on other questions. The predicted difference between a child who tried hard and one who did not was 1.73 for kindergarteners and 1.72 for fourth graders. The trial effect was significant, $F(1, 4) = 52.45$, $p < .001$, as was the try versus no-try difference for kindergarteners and fourth graders ($p < .05$ for each).

Structured Questions: Chi-Square Tests on the Incidence of Perceived Effects

On three of the preceding questions, fourth graders appeared to have a relatively firm grasp of the noncontingent nature of the card task. As Table 2 illustrates, however, another view of the data suggests that fourth graders' concepts of chance and noncontingency depart noticeably from an ideal model. A precisely accurate concept would lead one to predict equal winnings for older and younger children, and so forth. Most fourth graders were unwilling to carry their perceived noncontingency this far. Even those fourth graders who had strongly asserted the chance-controlled nature of the task on unstructured questions proceeded to predict higher winnings for children who were older, had practiced, were smarter, or had tried harder. In fact, of the 17 children who mentioned luck or chance as a determinant of outcomes on at least one of the unstructured questions, only 1 went on to predict equal winnings for both children in all four structured comparisons. Six made the perceived contingency error on all four questions, 4 made the error on three questions, 3 made the error on two questions, and 3 made the error on one question.

Just World Beliefs

A 2 (Grade) × 2 (Winnings) unweighted means ANOVA revealed no main or interaction effects on Just World scores (all $ps > .50$). A score for degree of perceived contingency on the card task was computed by summing the four difference scores from the structured questions (i.e., chips for older minus younger child, etc.). Among kindergarteners, virtually all of whom perceived the task as highly contingent, this score correlated only .24 (*ns*) with Just World scores. But among fourth graders, who showed greater variability in their awareness of noncontingency on the card task, overall perceived contingency on the task was significantly correlated, .61 ($p < .01$), with Just World scores.

Table 2
Number of Children Making Various Contingency Judgments

Contingency-related factor	Grade[a]	Predicted winnings compared: Different	Same
Age (older vs. younger child)	K	20	2
	4th	14	9
Practice (child with practice vs. child without practice)	K	22	0
	4th	18	5
Intelligence (smart vs. not smart)	K	22	0
	4th	15	8
Effort (try hard vs. not try)	K	20	2
	4th	22	1

Note. K = kindergarten.
[a] The only significant grade effect was on intelligence, $\chi^2(1) = 7.08, p < .01$.

Discussion

Between kindergarten and fourth grade, marked change seems to take place in children's awareness of noncontingency. The change apparently occurs in the direction predicted by Piaget (1930, 1976). Unlike most fourth graders, kindergarteners explained high or low winnings at the noncontingent task by reference to factors that would only affect contingent outcomes (e.g., skill, concentration), and predicted higher winnings for older, practiced, and smarter children than for younger, unpracticed, and less smart children, respectively. Yet, even fourth graders (like some adults—see Langer, 1977), revealed lingering doubts as to the complete irrelevance of competence-related factors. Questions about practice effects revealed evidence of self-serving bias, but only among kindergarteners. This suggests that the bias may be most powerful when understanding of noncontingency is weakest. (Alternatively, some fourth graders may recognize chance and noncontingency as a useful self-serving explanation for unfavorable outcomes.)

Just World questionnaire data indicate that among older children failure to recognize noncontingency in a simple laboratory task may relate to causal perceptions in everyday life, possibly including a tendency to blame victims (including themselves) for misfortune. Illusory contingency may also contribute to poor choices of where to invest time, energy, or self-esteem. Such negative consequences are often underemphasized in the literature on control (e.g., Seligman, 1975), which stresses the adverse effects of *under*estimating contingency (for a related complaint, see Rotter, 1975, p. 60). But both kinds of contingency errors can be harmful, so it is important to understand how both develop. Consequently, efforts to trace the developmental course of illusory contingency are an indispensable complement to developmental research on learned helplessness (e.g. Weisz, 1979).

I suggested at the outset that to understand perceived control in children, we must distinguish between judgments about personal competence and judgments about the contingency of outcomes (see also Weisz & Stipek, Note 1). To illustrate the developmental significance of this point in the context of the present findings, let us consider a prominent discussion of perceived control and personal causality in which Lefcourt (1976) asserts that age is "among the most obvious sources of change" (p. 113). With age, he argues, children perceive that "one becomes more capable of obtaining desired satisfactions" (p. 113), and thus their perceived personal control increases. Lefcourt's developmental hypothesis may hold with respect to perceived competence, the dimension on which his rationale seems to focus. But the present data indicate that precisely the reverse developmental pattern may be demonstrated for the dimension of perceived contingency. So, for the developmentalist, the present findings are significant in suggesting a complex bidimensionality in the ontogenesis of perceived control. Thus far, we do not know a great deal about developmental change along either of these control-relevant dimensions. Expanding our knowledge in both areas remains a significant task for future research on the developmental psychology of control.

Reference Note

1. Weisz, J. R., & Stipek, D. *Developmental change in perceived control: Review, critique, and proposed agenda.* Unpublished manuscript, University of North Carolina at Chapel Hill, 1979.

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