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A Reexamination of Developmental Changes in Causal Attributions

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Abstract

The current study examined young children's use of the presence or absence of extrinsic reward to make inferences about the intrinsic motivation of another person. Previous research indicates that most kindergartners do not use a discounting heuristic, but it was hypothesized that they may have misinterpreted the questions asked. Kindergarten, second, and fourth graders were presented stories about children who were rewarded or not rewarded for performing various activities. Two forms of questioning about motivation were compared. When a traditional form was used, kindergartners did not show evidence of a discounting heuristic. When the questions were adjusted to ask more specifically about intrinsic motivation, children at all grade levels appeared to use a discounting heuristic. Results are discussed in terms of the parameters of the attributional effects, the possible mechanisms responsible for the phenomena, and the significance of the findings for other developmental research using self-report techniques.

In Kelley's (1973) discussion of attribution, an attempt was made to understand the processes by which an individual comes to attribute behavior to internal or external sources. The most interesting cases involved the presence of multiple causes, any of which might be sufficient to produce the behavior. Here, Kelley proposed that when a possible extrinsic cause was present, an observer may "discount" the causal importance of intrinsic causes.

Recently, several investigators have begun to explore the development of such attributional schemata. In 1973, Lepper, Greene, and Nisbett showed that preschool children who were rewarded for performing an attractive activity showed less interest in that activity during a subsequent free play period than did children who had engaged in the activity without extrinsic reward. Lepper et al. (1973) termed this phenomenon *overjustification*; using Kelley's (1973) model, the relevant cognitive process would be the discounting of an intrinsic cause (interest) in the presence of an extrinsic cause (reward). Such research appears to support the premise that very young children can use the discounting principle for self-perception.

Subsequent investigators, however, have questioned whether 5- to 7-year-old children actually attribute behavior in the same way as the use of the discounting principle would predict. In two studies (Shultz, Butkowsky, Pearce, & Shanfield, 1975; Smith, 1975),

kindergarten and elementary school children were presented with stories about hypothetical others who were or were not rewarded for their behavior. Both concluded that children were not capable of using the discounting principle until approximately the second grade (i.e., 7- to 8-year-olds). A third study (Karniol & Ross, 1976) suggested that the majority of kindergartners did use a systematic model to understand social behavior, but for half or more of these children, the model was based on an additive rather than a discounting principle. That is, for a large proportion of the children, greater liking of the activity was inferred when both extrinsic and intrinsic factors were present in the story than when the extrinsic factor was absent. The findings of these studies seem to suggest that the majority of 5- to 7-year-old children do not use a discounting principle, a position that calls into question the attributional explanation of the Lepper et al. (1973) results.

One explanation of the discrepancy between self- and other-perception studies is that children may be able to respond in a more advanced way to their own behavior than to that of others, especially hypothetical others (Shultz & Butkowsky, 1977a); initial testing of this hypothesis, however, has not yielded supportive evidence (Shultz & Butkowsky, 1977b). Alternatively, other-perception studies may have employed an experimental method that is confusing for young children, an hypothesis examined by Kassin, Lowe, and Gibbons, 1980. Rather than using an abstract, linguistic presentation of hypothetical stories, Kassin et al. designed a perceptual analogue task. In their studies, children were shown an animated film that depicted the movements of two triangles toward a house. One was carried to its destination by another object, whereas the other travelled without assistance. On this task, even kindergartners discounted the effort made by the triangle when it was assisted in its journey. Kassin et al. (1980) concluded that by kindergarten many children have acquired the conceptual capabilities to reason using a multiple sufficient cause (MSC) schema. They fail to use this schema to interpret interpersonal interactions involving rewards, however, because they interpret rewards as bonuses rather than bribes. Although possible, this explanation does not account for the evidence of discounting by preschool children in the self-perception studies.

Another explanation, and the focus of the present research, is based on the method of assessment used in the other-perception studies. In these investigations, children were presented with stories in which one hypothetical child played with a toy in the absence of incentives, whereas another child was rewarded for playing with it. The children then were asked which story character really wanted to play with the toy. Implicitly, the experimenter was requesting an assessment of intrinsic interest in the absence of reward or apart from the reward. It is not clear, however, that young children interpreted the question in this way. It is quite possible that the typical kindergartner is insufficiently skilled at the interpretation of questions to understand that the experimenter is asking for intrinsic motivation rather than total motivation. If this is true, results that have been interpreted as use of an additive principle actually may indicate that these young children perceive total motivation in any particular situation to be greater when both intrinsic and extrinsic sources of motivation are present. This explanation does not necessarily contraindicate the possibility that some children might infer intrinsic motivation by using a discounting principle. That is, it could be that the absence of an overjustification effect in kindergarten populations is not due to their inability to use the discounting principle; instead, it may reflect the relative difficulty that

young children encounter in interpreting the purpose of and appropriate response to the questions of an attribution theorist.

The following study examined the above hypothesis by varying the method by which children were asked to judge how much a hypothetical other liked an activity. Kindergarten, second, and fourth grade children were presented with a series of stories in which the protagonists did or did not receive a reward for engaging in various activities. One condition (reward contamination) was patterned after previous investigations, whereas the second condition (reward free) was intended to provide a clearer assessment of intrinsic motivation. In the reward-contamination condition, children were asked to assess “liking” when the protagonist was in the presence of the reward. Here it was predicted that the results would parallel the Karniol and Ross (1976) results. In contrast, in the reward-free condition children were asked to infer the “liking” of an activity by protagonists with or without a reward *history* but at a subsequent time when none were in the presence of a reward. Here, a greater discounting effect was expected. Both judgments of liking and explanations of the protagonist's behavior were used as criteria because investigators currently disagree about which criterion is the more appropriate basis for inferring an underlying structure (Kassin, 1981).

The final purpose of the investigation was to examine the effect of the valence of the activity on the appearance of additive and discounting effects. Previous developmental research has examined the effect of reward presence on the inferred liking of protagonists for positive valenced activities only. As yet, no studies have included negatively valenced activities in their research design. Thus, to gather preliminary information in this area, valence of the behavior performed by the story character was varied.

Method

Subjects

Subjects were 19 male and 19 female children at each of three grade levels (kindergarten, second grade, and fourth grade). Four children had difficulties understanding the dependent measures and hence were not included in this final sample of 114 children. Two female undergraduates, naive to the study's hypotheses, conducted the experimental sessions.

Task Material

The task was comprised of eight stories, each depicting a different boy engaged in some activity in the presence or absence of reward. In half of the stories the activity was positively valenced (playing with a puzzle, reading a book, coloring, and playing with a ball), whereas in the other half the activity was negatively valenced (going to bed early, hanging up clothes, playing by himself, and sitting inside). The valence of each activity was established through piloting with a separate sample of 30 children; all activities were rated as positive or negative by at least 90% of the children.

Each child was told four stories in which the boy's mother gave him a reward (\$.50 or a cookie) for engaging in the activity and four stories in which a reward was not mentioned. Stories involving each activity were crossed with the presence/absence and type of reward

and counterbalanced across subjects. A sample story is as follows: “Here is Steve. Steve's mom tells him that if he plays with the puzzle, she will give him a cookie. Steve plays with the puzzle. Steve's mom gives him a cookie.” Each of the stories was accompanied by a series of line drawings.

Children indicated their assessment of the story character's liking for the activity by pointing to a face on a 7-point Likert scale comprised of a series of faces whose expressions ranged from a large frown (1) to a large smile (7).

Procedure

Children were tested individually in a small room at their school. First, each child was trained in the use of the 7-face scale. After the training, the child was read eight stories, with recall being assessed after each one. This step was included to assess the possibility of differential memory of the rewarded versus nonrewarded stories, a methodological issue raised by Karniol and Ross (1976). All children recalled each of the stories accurately.

After recalling each story, children in the two experimental conditions were asked to assess liking in different manners. In the reward-contamination condition the children were asked: “How much does (the story character) like to (perform the activity) in the story?”; then the children were asked “Why did (the story character) perform the activity in the story?” It was hypothesized that children might include the protagonist's wish to be rewarded in their ratings and judgments.

In contrast, in the reward-free condition, the question was phrased to directly measure intrinsic liking separate from the presence of reward. In this condition, the child was asked what the story character would do at a later temporal point when no reward was present. Specifically, the question took the following form. “Now it is a whole week later Steve is alone. His mom is not home. Steve can decide to (perform the activity) or he can decide not to (perform the activity). What will he decide?” (Child responds.) “How much does he like (performing the activity)?” The child then was asked “Why did/didn't (story character name) (perform the activity)?” Finally, each child was asked “Why did (story character name) (perform the activity) in the story?”

It should be noted that this procedure parallels the behavioral means traditionally used to assess intrinsic interest. For example, in the Lepper et al. (1973) study, overjustification was demonstrated by showing a decrease in interest after the reward had been removed—not by showing a reduced interest while the reward was still present.

Coding of Responses

In both conditions the answers children gave to the question, “Why did (story character's name) (perform the activity)?” were coded into three categories: clear internal attributions, clear external attributions, and other reasons with ambiguous attributions loci. Internal attributions included statements that the protagonist performed the activity because it gave him or her personal satisfaction (e.g., “he liked it”) or because he or she did not like the alternative. External attributions included statements that the child performed the activity in compliance with a command or in order to receive a reward (e.g., “his mom told him to,”

“so he could get a cookie”). The “other” category included “don't know” statements and other responses that did not contain sufficient information to make a clear internal/external distinction. Two undergraduates, naive to the conditions of the children and the experimental hypotheses, used this system to code the reasons children gave for the story characters' behaviors. To assess interrater reliability, both observers coded 25% of the responses. Kappas on the individual categories all exceeded .90.

Results

Analyses of the Likert scale ratings of liking provided strong support for the hypotheses. An initial analysis revealed no main effect for sex and only one significant sex interaction, sex by grade, $F(1, 102) = 3.08, p = .05$. Because the major results applied to each sex, data were collapsed across sex.

The principal analysis was comprised of a four-way analysis of variance (ANOVA) in which grade and condition were between-subject variables and valence and reward presence/absence were within-subject variables. The analysis revealed four significant main effects. As predicted, the presence of a reward led to ratings of lower liking for the activity than did the absence of reward, $F(1, 108) = 49.99, p < .001$, replicating the major findings of the insufficient and oversufficient justification literatures (Bern, 1972; Lepper et al., 1973). In addition, significant main effects were obtained for grade, $F(1, 108) = 73.66, p < .001$, and valence, $F(2, 108) = 17.64, p < .001$. Not surprisingly, the valence effect was due to the tendency for negative activities to receive lower liking ratings than did positive activities. Post hoc analyses using Tukey's HSD test revealed that the grade effect was due to lower liking scores by fourth graders compared to kinder-gartners and second graders, $ps < .01$.

The above main effects were modified by several significant interactions. A valence by grade interaction, $F(2, 108) = 3.57, p < .05$, reflected an increase with age in the differentiation between positive and negative activities; the valence effect, however, was significant at each of the grade levels, Tukey's HSDs, all $ps < .01$. The above trend was more pronounced in the reward-free condition, leading to a significant valence by grade by condition interaction, $F(2, 108) = 3.37, p < .05$.

Most important, the interaction between reward and condition, $F(2, 108) = 3.98, p < .05$, supports the hypothesis that the reward-contamination condition may mask the presence of a discounting effect. In the reward-contamination condition, ratings of the rewarded and nonrewarded activities were significantly different ($M = 10.56$ vs. $M = 11.58$, respectively, $p < .05$), but in the reward-free condition, the difference between the two means was almost twice as great ($M = 9.56$ vs. $M = 11.40$, respectively, $p < .05$).

The principal hypothesis of this investigation was that a discounting effect would appear for children in the youngest age group if the reward-free procedures were used, whereas the more confusing reward-contamination procedures would lead to a weaker overall effect. This hypothesis was examined by a series of a priori comparisons using orthogonal t tests. As shown in Table 1, kindergarten children in the reward-free condition made lower liking judgments on reward stories ($M = 11.5$) than on no reward stories ($M = 12.53, t = 2.06, p < .$

05), whereas kindergartners in the reward-contamination condition did not (reward $M = 11.9$ vs. no-reward $M = 12.03$, $t < 1$, ns). It should be noted that the significant effect for kindergartners is in part due to an augmentation in the reward-free nonreward condition, a result not predicted by any existing theory. Significant reward differences were found in both conditions of second and fourth grade children, $ts > 2.50$, $ps < .05$.

Next, the data were examined to determine the proportion of children in each cell who appeared to be using an additive or a discounting principle. Children whose summed score on the reward stories exceeded their score on the nonreward stories by at least two were designated as adders, whereas children with the reverse configuration were designated as discounters; the other children were considered to be inconsistent. In the reward-contamination condition, 32% of the kindergarten children and 11% of the second- and fourth-grade children were adders. In the reward-free condition 11% of the children at each grade level were adders. Additionally, at all grade levels a higher proportion of discounters were found in the reward-free condition than in the reward-contamination condition (kindergarten, 47% vs. 32%; second grade, 74% vs. 58%; fourth grade, 84% vs. 58%).

Attributions

Next, the attributions children made regarding the source of the story character's liking or disliking for each activity were examined. The first analysis was performed on the responses given to the question "Why did the story character perform the activity *in the story*?" the question asked to children in both experimental conditions. Table 2 presents the frequencies of intrinsic, extrinsic, and other reasons given by children in the various conditions.

Analyses of these qualitative data were conducted using a log-linear modeling technique (Bishop, Fienberg, & Holland, 1975). In this procedure a log-linear model is fitted to the cell frequencies by deriving the logarithm of the expected cell frequencies as a function of main effects and interactions. This process is analogous to the general linear model underlying ANOVA techniques.

The analyses were conducted on a five-way table of frequencies in which condition, valence, reward, grade, and reasons were factors. Initially, an analysis was conducted to determine what level of factorial interaction was required for a log-linear model to reproduce the cell frequencies satisfactorily. The analysis revealed that the data could be adequately fitted by a model comprised of the main effects, two-way, and three-way interactions, $G^2 = 25.46$, $p > .10$.

Next, Brown's (1976) tests of partial association were conducted to determine which factors provided contributions to the fit of the model. This procedure determines whether a significant difference exists between the fit of a full model of K-level and a new model in which the specified K-factor interaction term has been deleted. This technique is analogous to a stepdown procedure in multiple regression.

The distribution of reasons was found to be significantly affected by several factors. A main effect for reason type was found, $G^2 = 74.76$, $p < .001$, reflecting a general tendency for children to give fewer responses that were classified as clearly intrinsic (20%) than clearly extrinsic (42%) or ambiguous (38%). However, several interactions modified this tendency.

First, a grade by reasons interaction appeared, $G^2 = 81.93$, $p < .001$. Subsequent within-grade analyses revealed that the distribution of reasons for second and fourth graders paralleled the overall trend, $G^2 = 40.5$, $p < .001$, whereas kindergartners gave responses that were equally distributed across reason categories, $G^2 = 1.33$, $p > .10$. A valence by reason interaction, $G^2 = 15.99$, $p < .001$, appeared due to a tendency for children to give intrinsic reasons more frequently for positive activities and extrinsic reasons more frequently for negative activities.

Importantly, the reasons by reward effect was also highly significant, $G^2 = 571.77$, $p < .001$. On the reward stories, 78% of the responses were extrinsic, whereas on the no-reward stories this category included only 7% of the responses. The influence of reward became more pronounced as the children increased in age, leading to a significant reasons by reward by grade effect, $G^2 = 20.32$, $p < .001$. Reward presence did, however, affect the distribution of reasons for each age group, all G^2 s > 100 , $ps < .001$.

Experimental condition influenced distribution of reasons within the following two three-way interactions: (a) reasons by condition by grade, $G^2 = 10.20$, $p < .05$, and (b) reasons by reward by grade, $G^2 = 8.07$, $p < .05$. Separate analyses of each grade and condition were conducted to determine the bases of these interactions. The reasons by grade and reasons by reward interactions previously described were significant within each condition, all $ps < .001$; however, the reasons by grade effect was stronger in the reward-free condition, whereas the reasons by reward effect was comparatively stronger in the reward-contamination condition (see Table 2).

Reward-Free Condition Analyses

In the reward-free condition, children also were asked whether the protagonists would or would not engage in the activity at a subsequent point in time when no reward was present. Children's reports of whether they would or would not continue the activity were significantly, but moderately, correlated with their ratings of the enjoyment of the activity, $r = .45$, $p < .001$.

Log-linear modeling techniques were used to fit the cell frequency of a five-way table in which grade, valence, reward, reasons type, and action (repeat/not repeat the behavior) were factors. Cell means are presented in Table 3. The overall analysis revealed the fit improved through the inclusion of three-way interactions, decrease in $G^2 = 43.92$, $p < .05$. Brown's test of partial association revealed that six interaction terms contributed significantly to the fit.

Overall, children tended to predict that the protagonists would continue their activities at a future time, $G^2 = 42.02$, $p < .001$. They were more likely to predict continuation when the activity was a positive one than a negative one, $G^2 = 7.33$, $p < .05$. Most supportive of the present hypothesis, the reward history of the story characters affected the likelihood that children would predict continuation of the activity, $G^2 = 12.38$, $p < .001$. As can be seen in Table 3, children were more likely to suggest that a protagonist with a reward history would not perform the activity in the absence of the reward agent than would the protagonist who had never been rewarded. In response to the request for prediction of future behavior, 40% of the responses in reference to a rewarded character were predictions that the protagonist

would not perform the activity again; for nonrewarded characters, 25% of the predictions were of this category.

When asked why they thought the story character would or would not continue the activity, children were more likely to give external reasons if the character had a reward history than if the character did not, $G^2 = 53.62$, $p < .001$. Children were more likely to give internal reasons when the activity was a positive one, $G^2 = 7.33$, $p < .05$, and when they were predicting that the character would *not* continue, $G^2 = 10.23$, $p < .01$. This latter effect might be understood if children viewed a change in behavior as more indicative of intrinsic characteristics than continuing to perform the same activity over time. The effect was more pronounced for older children than for younger children, $G^2 = 3.20$, $p < .05$, and was more pronounced for negative than for positive activities, $G^2 = 8.10$, $p < .05$.

Discussion

Previous investigations have concluded that 5- to 7-year-old children do not make systematic differentiations between rewarded and nonrewarded conditions in terms of inferred presence of intrinsic motivation (Shultz et al., 1975) or that children are equally likely to use “additive” and “discounting” heuristics (Karniol & Ross, 1976). Similarly, kindergarten children in the reward-contamination condition of this study showed no overall reward effect on the attitude measure, whereas discounting effects were found with the older children. Based on the reward-contamination condition alone, it might be concluded that few kindergarten children systematically use the discounting principle as a rule for social understanding.

In contrast, when the procedure used for questioning was designed to elicit inferences about intrinsic motivation alone, a different pattern of results emerged. Here, in the reward-free condition, the kindergarten children did show a discounting effect on the measure of liking. Thus, the form of the question was designed to present the child with a verbal analogue of the Lepper et al. (1973) situation and did, in fact, yield responses consistent with those of the overjustification literature.

When the children were asked to interpret the behavior of rewarded versus nonrewarded story characters, the attributions given revealed the powerful effect of reward presence. Not surprisingly, the most common reason given for the behavior of the constrained protagonist was that he or she would be given a reward for his or her activity. Even among the kindergartners, this reason category included 55% of the responses in the rewarded stories, but only 5% in the nonrewarded stories. Although consistent with previous findings, this effect could be due to a tendency for the children to seize upon the most salient and obvious explanation for a behavior when asked to produce one.

The more provocative findings in this study are those involving the attributions given by the children in the reward-free group to the question regarding the protagonist's behavior a week later. Here the children were asked to interpret the behavior of story characters performing *exactly* the same behavior under *exactly* the same (nonrewarded) conditions. The characters differed only in that they did or did not have a reward history. Still, marked differences were

found in the assignment of intrinsic versus extrinsic reasons for the protagonists' performance on reward and nonrewarded stories.

Kassin (1981) observed that casual attributions in an experimental setting involve a three-stage process: (a) extracting the information from the environment, (b) processing the information and drawing the appropriate inference, and (c) expressing an attribution in response to the experimenter's inquiry. The present findings suggest that the previous failures to observe discounting in young children may actually reflect young children's problems in interpreting the questions of the experimenter (Stage 3)—not the absence of appropriate causal schema. The significant condition by reward interaction occurred in precisely the pattern expected if some young children perceived the question in the reward-contamination condition to be a request for total motivation, whereas in the context of the reward-free condition, it was more generally perceived as a request for intrinsic motivation alone. That is, when no reward was present, the ratings were equal in the two conditions, but when a reward was present, the ratings in the reward-contamination condition were higher.

Interestingly, the valence of the activity (positive or negative) did not affect the pattern of results. Kassin et al. (1980) suggest that strongly valenced activities may interfere with the use of a discounting principle. That is, a child might not discount the intrinsic motivation of someone who chose to engage in positive activity, regardless of whether he or she was rewarded. Conversely, a child might discount the intrinsic motivation of anyone who engaged in a negative activity simply because of the undesirability of the activity. If so, one may expect to see the strongest evidence of a discounting effect when neutral activities are described, but one may not necessarily expect differential effects for positive or negative activities. Of course, the fact that the effects were found for both positive and negative effects provides support for the robustness of the observed phenomena.

The current results can be seen as particularly strong considering that several other facets of the experimental procedure made it less likely that discounting effects would be obtained. Unlike previous investigations, the current study used separate attitude ratings for each story such that equal ratings could be assigned for the reward and no-reward stories. In addition, previous investigators have suggested that the use of hypothetical rather than "real" behavior, and an other-perception rather than a self-perception task, might attenuate a discounting effect (Kassin & Lepper, in press). Yet such an effect was found for all age groups in this study; thus, an attitudinal replication of the behavioral demonstration of overjustification by Lepper et al. (1973) was achieved.

Investigators using self-report measures need to pay greater attention to the possibility that the inferred meaning of the question may change developmentally. Although the same experimental question may be asked to children of different ages, the assumed meaning of the question may differ systematically with age (Bierman, in press). Firm statements about developmental changes require an assessment of the perceptions and interpretations of the children involved.

Possible Mechanisms for the Discounting Effect

The failure to find differences as would be predicted by the discounting principle in young children has been linked to the child's failure to decenter—that is, the inability to focus simultaneously on intrinsic and extrinsic aspects of the situation (Shultz et al., 1975; Smith, 1975). In fact, Smith (1975) suggested that children who *do* show evidence of the use of the discounting principle, as did most children in the present study, may instead be using a “partial schema.” Specifically, rather than any simultaneous consideration of intrinsic and extrinsic causes, children were seen as simply responding to the pressure of extrinsic causes by attributing action to it and responding to the absence of extrinsic causes by attributing actions to intrinsic causes. This explanation would indeed explain the results and would be more consistent with the well-known difficulties that young children encounter in dealing with two or more aspects of a situation at the same time (Inhelder & Piaget, 1958). Subsequent research should consider mechanisms such as Smith's (1975) use of partial schema, Smith and Dalenberg's episode recognition concept (1977, 1979) or Bern's (1972) self-perception theory, all of which are more compatible with the subject's cognitive abilities.

In addition, these findings have several implications for previous interpretations of the effects of extrinsic rewards. The Lepper et al. (1973) study generated a reasonable amount of controversy, including several nonattributional reinterpretations of the results (see Kassin & Lepper, in press). Most of these criticisms suggested mediating factors for the overjustification phenomena, such as fatigue or competing responses, that would be expected to operate in self-perception instances, but *not* in cases in which a subject was making judgments about others. Thus, the current demonstration of an “overjustification” effect within other-perception studies is more convincing evidence of the young child's ability to use the discounting principle than would be similar results in self-perception studies, because fewer alternative explanations for the predicted relationships are available. Because the mechanisms behind the “overjustification” or “discounting” effects remain unclear, it seems more appropriate to use the term *inverse magnitude of reward effect* (IMRE) for the relationship between rewarded and nonrewarded condition because this term does not imply a particular mechanism behind the results.

In summary, the present research has raised two major issues for further investigation. First, it is strongly indicated that the difficulty in obtaining a discounting effect with young children is due partially to the difficulty that children encounter in understanding the questions asked of them. Research in several subareas of developmental psychology should be done in order to differentiate developmental effects due to increased skill in interpreting questions from effects due to other types of cognitive change. Second, investigations concentrated on achieving greater understanding of the mechanism(s) behind the IMRE are indicated; further research will attempt to differentiate between available theories to explain the IMRE and its development.

References

- Bem, DJ. Self-perception theory.. In: Berkowitz, L., editor. *Advances in experimental social psychology*. Vol. 6. Academic Press; New York: 1972.

- Bierman KL, Lahey BB, Kazdin AE. Cognitive development and clinical interviews with children. *Advances in clinical child psychology*. 6 in press.
- Bishop, JMM.; Fienberg, SE.; Holland, PW. Discrete multivariate analysis Theory and practice. MIT Press; Cambridge, MA: 1975.
- Brown MB. Screening effects in multidimensional contingency tables. *Applied Statistics*. 1976; 25:37–46.
- Dalenberg, CJ.; Smith, TL.; Bolstad, O. Reward contingency. Test of a social recognition theory concept. University of Denver; 1979. Unpublished manuscript
- Inhelder, B.; Piaget, J. The growth of logical thinking from childhood to adolescence. Basic Books; New York: 1958.
- Karniol R, Ross M. The development of causal attributions in social perception. *Journal of Personality and Social Psychology*. 1976; 34:455–464.
- Kassin, SM. From laychild to “layman”: Developmental casual attributions.. In: Brehm, SS.; Kassin, SM.; Gibbons, FX., editors. *Developmental social psychology*. Oxford University Press; New York: 1981.
- Kassin, SM.; Lepper, MR. Oversufficient and insufficient justification effects Cognitive and behavioral development.. In: Nicholls, J., editor. *The development of achievement motivation*. JAI Press; Greenwich, CT: in press
- Kassin SM, Lowe CA, Gibbons FX. Children's use of the discounting principle A perceptual approach. *Journal of Personality and Social Psychology*. 1980; 39:719–728. [PubMed: 7431209]
- Kelley HH. The process of causal attribution. *American Psychologist*. 1973; 28:107–128.
- Lepper MR, Greene D, Nisbett RE. Undermining children's intrinsic interest with extrinsic rewards: A test of the overjustification hypothesis. *Journal of Personality and Social Psychology*. 1973; 28:129–137.
- Shultz TR, Butkowsky I. Young children's use of the scheme for multiple sufficient causes in the attribution of real and hypothetical behavior. *Child Development*. 1977a; 48:464–469.
- Shultz, TT.; Butkowsky, I. A reassessment of the development of the scheme for multiple sufficient causes Attribution of one's own behavior and the real and hypothetical behavior of others. McGill University; 1977b. Unpublished manuscript
- Shultz TR, Butkowsky I, Pearce JW, Shanfield H. Development of schemes for the attribution of multiple psychological causes. *Developmental Psychology*. 1975; 11:502–510.
- Smith MC. Children's use of the multiple sufficient cause schema in social perception. *Journal of Personality and Social Psychology*. 1975; 32:737–747.
- Smith, TL.; Dalenberg, CJ. Social recognition theory. University of Denver; 1977. Unpublished manuscript

Table 1

Individual Cell Means of Liking Ratings by Conditions and Activities

Grade	Reward-contamination condition				Reward-free condition			
	No reward		Reward		No reward		Reward	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Kindergarten	12.47	11.58	12.68	11.11	12.95	12.10	11.84	11.16
Second	12.79	10.95	11.63	9.58	11.79	10.16	9.42	8.42
Fourth	11.32	10.42	10.21	8.16	12.05	9.32	9.89	6.63

Note Scores are summed across two stories in each condition. Higher scores reflect greater liking

Table 2

Frequencies of Intrinsic, Extrinsic, and Other Attributions for Protagonist's Activity

Reason	Reward-contamination condition				Reward-free condition			
	No reward		Reward		No reward		Reward	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Kindergarten								
Internal	20	11	11	4	20	13	13	12
External	2	0	26	25	2	4	15	18
Other	16	27	1	9	16	21	10	8
Second grade								
Internal	10	5	3	0	14	11	8	1
External	0	2	34	37	2	6	26	30
Other	28	31	1	1	22	21	4	7
Fourth grade								
Internal	10	8	0	0	6	5	0	0
External	0	3	34	35	0	5	38	38
Other	28	27	4	3	32	28	0	0

Note Each child gave one reason for each of two stories. Thus a total of 38 reasons occur in each cell.

Table 3
Frequencies of Intrinsic, Extrinsic, and Other Attributions for Continuing or Changing Activities

Reason	Continue				Not continue			
	No reward		Reward		No reward		Reward	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Kindergarten								
Internal	16	8	11	6	5	6	3	4
External	2	5	12	16	0	0	4	2
Other	12	13	4	4	3	6	4	6
Second grade								
Internal	14	7	11	2	5	5	8	5
External	1	4	7	11	1	1	7	4
Other	13	15	4	10	4	6	1	6
Fourth grade								
Internal	18	11	7	3	3	10	7	16
External	0	3	6	4	0	1	4	5
Other	16	11	11	7	1	2	3	3

Note Children in the reward-free condition indicated whether they thought the protagonist would continue the activity a week later and why. The table depicts the frequency of each reason given for continuing or not continuing.