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Developmental Differences in the Use of Distinctiveness, Consensus, and Consistency Information for Making Causal Attributions

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The present study examined developmental differences in the use of distinctiveness, consensus, and consistency information for making causal attributions. First, third and sixth graders and college students were presented with brief story pairs consisting of an act manifested by an agent toward a target person. Each story in a pair was accompanied by a different level of a particular type of information (e.g., high consensus for one and low consensus for the other). Subjects were asked to make causal inferences about both the agents and the targets. The results revealed significant age-related differences in the ability to use each type of information in the manner predicted from Kelley's causal attribution model. Young children's use of distinctiveness information yielded the predicted agent attributions significantly more often than it yielded the predicted target attributions, while the reverse was true for consensus information. These findings were interpreted in terms of the causal principles involved: Information was used in the predicted manner at a younger age when a covariation principle was required than when a discounting principle was required.

In everyday-life situations, people frequently ascribe causes to their own and other people's behavior. Indeed, determining the causes of social events is very important, for it provides them with meaning and enables people to feel that they can predict and control their environment (Heider, 1958). In recent years, social psychological research has produced a body of knowledge termed *attribution theory*, which describes the processes involved in making causal inferences. One model of the attribution process that has been proposed (Kelley, 1967) describes three types of information that people may use in making causal attributions for an agent's behavior toward a target person: (a) distinctiveness information, which reveals whether or not that agent responds similarly toward other targets; (b) consensus information, which reveals whether or not others respond similarly toward that target; and (c) consistency information, which reveals whether or not a similar response is produced by that agent whenever that target is present. Research testing this model (e.g., McArthur, 1972, 1976; Orvis, Cunningham, & Kelley, 1975) has revealed that causal attributions to the target of a response are facilitated by high consensus, high distinctiveness, or high consistency, whereas low consensus, low distinctiveness, or high consistency information facilitate causal attributions to the agent.

Although children's understanding of the causes of behavior would seem to be an important aspect of social growth and interaction, there has been little systematic investigation of developmental changes in the use

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of consensus, distinctiveness, and consistency information. Furthermore, Kelley's (1967) model makes no explicit predictions regarding developmental changes in the ability to use the three types of information. However, reasonable predictions can be generated by considering the causal principles that must be applied in order to use each type of information for making agent and target attributions.

A very basic causal principle is the covariation principle: "Effects are attributed to those causal factors with which they uniquely covary rather than to those of which they are relatively independent" (Kelley, 1973, p. 151). Although each of Kelley's three information variables provides covariation evidence, they differ in the causal factors that this evidence identifies (Anderson, 1974; McArthur, 1976). The covariation evidence provided by distinctiveness information identifies the presence or absence of causal factors in the agent of an effect. For example, if one wants to understand why an agent helps a target, the information that the agent also helps other targets (low distinctiveness) reveals that the effect of helping covaries with the agent and that a cause in the agent is present. On the other hand, the information that the agent does not help other targets (high distinctiveness) reveals that the effect does not covary with the agent and that a cause in the agent is absent. The covariation evidence provided by consensus information identifies the presence or absence of causal factors in the target of an effect. For example, the information that others also help the target (high consensus) reveals that the effect of helping covaries with the target and that a cause in the target is present. On the other hand, the information that others do not help the target (low consensus) reveals that the effect does not covary with the target and that a cause in the target is absent. The covariation evidence provided by consistency information identifies the presence or absence of causal factors in both the agent and the target. For example, the information that the agent always helps the target (high consistency) reveals that the effect of helping covaries with both the agent and target and that a cause may be present in either. On the other hand, the information that the agent rarely helps the target reveals that the effect of helping does not covary with the agent or the target and that a cause in either is absent.

A number of studies (Karniol & Ross, 1976; Shaklee, 1974; Shultz & Mendelson, 1974; Siegler & Liebert, 1974) have shown that the covariation principle can be used by very young children (3–5 years old) to explain physical happenings, to predict behavioral events, and to infer causes. It thus seems reasonable to predict that first-grade children, who are approximately 5–6 years of age, would be able to apply the covariation principle needed for making causal inferences about agents on the basis of distinctiveness information, causal inferences about targets on the basis of consensus information, and causal inferences about both agents and targets on the basis of consistency information.

Although the covariation principle provides a relatively simple basis for making causal attributions, the discounting principle, which can build upon the covariation principle, requires a more complex inference process: "the role of a given cause in producing a given effect is discounted if other plausible causes are also present" (Kelley, 1973, p. 113). Utilizing distinctiveness information to make causal inferences about targets requires application of both the covariation and the discounting principles. In the example of an agent helping a target (see Figure 1), the covariation principle locates a plausible cause for the effect in the agent (A), who also helps other targets (low-distinctiveness information). Application of the discounting principle then casts into doubt the presence of a cause within the target of this agent's behavior. On the other hand, no evidence is provided for a cause in the agent (B) who doesn't help other targets (high-distinctiveness information), and a cause in the target of this agent's behavior is inferred to be present. A similar analysis can be made of the situation in which consensus information is provided and a causal inference about the agent of an effect is required. (see Figure 2). First, the covariation principle locates a plausible cause for an effect in the target (a) who also elicits helping from other agents (high-consensus information).

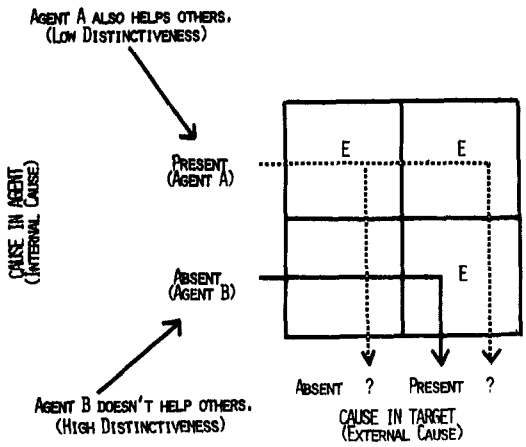

Figure 1. Causal inference for the effect (E) "*Agent helps target*": Application of the discounting principle to make attributions to the target on the basis of distinctiveness information. (Solid arrow represents inference that a cause is present or absent; broken arrow represents uncertainty regarding the presence or absence of a cause. Figure is adapted from Kelley, 1973.)

Next, application of the discounting principle casts into doubt the presence of a cause within the agent responding to this target. On the other hand, no evidence is provided for a cause in the target (b) who is not helped by others (low-consensus information) and a cause in the agent responding to this target is inferred to be present.

While very young children can successfully apply the covariation principle, there is evidence that they cannot apply a discounting principle. Shultz, Butkowsky, Pearce, and Shanfield (1975) found that 9- and 13-year-old children (fourth and eighth graders) were able to use this principle, while 5-year-olds (kindergarteners) were not. Similarly, Smith (1975) and Karniol and Ross (1976) found that most kindergarten children and many first graders did not employ the discounting principle in judging whether a child who played with a toy in the presence of external causes had been internally motivated to do so. Based on these findings, it seems reasonable to predict that the ability to use distinctiveness information to make causal inferences about targets will be present later than the ability to use it to make inferences about agents. On the other hand, the ability to use consensus information to make inferences about agents should be present later than the ability to use it to make inferences about targets.

Method

Subjects

Subjects in this study included 18 males and 18 females from each of four grade levels: first graders (5–6 years old), third graders (8–9 years old), sixth graders (11–12 years old), and college students (18–20 years old). The elementary school children were drawn from

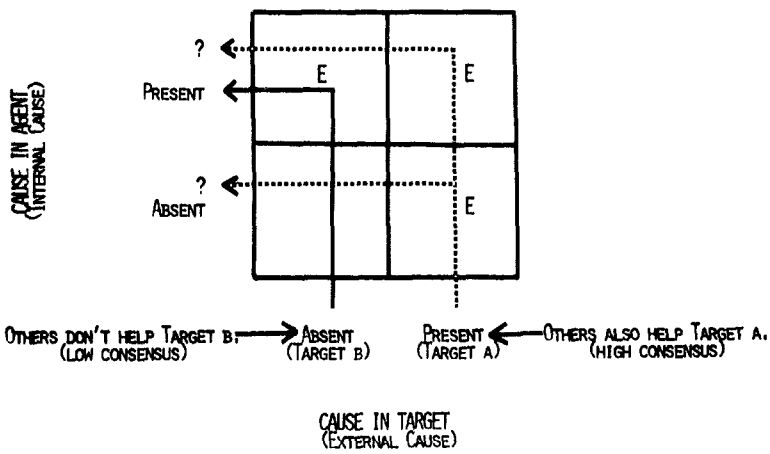

Figure 2. Causal inference for the effect (E) "*Agent helps target*": Application of the discounting principle to make attributions to the agent on the basis of consensus information. (Solid arrow represents inference that a cause is present or absent; broken arrow represents uncertainty regarding the presence or absence of a cause. Figure is adapted from Kelley, 1973.)

an upper-middle-class neighborhood in a Boston suburb, and the college students were volunteers from the Brandeis University undergraduate population. A seriation task (Inhelder & Piaget, 1969) administered to the elementary school subjects revealed that the first, third, and sixth graders were at the preoperational, concrete, and formal operational periods of cognitive development, respectively.

Materials

All subjects were presented with three story pairs that described positive (sharing, affection, and helping), negative (greediness, aggression, and ridicule), and neutral (running, sleeping, and dressing up) acts. Each story had two main characters (a total of four for the pair), one person who carried out the act (the agent) and one person who was being acted upon in some way (the target). The names of the main characters were different in each story in order to minimize contaminating effects across stories. The illustrations accompanying the story pairs were drawn by an artist on 12.5 × 15 cm illustration board and were colored with magic markers. Sex of the story character was counterbalanced with sex of subject by having half of the males and half of the females in each group hear all stories about boys while the other half heard stories about girls. So that the same pictures could be used for both sexes, the characters were portrayed as young children with short hair, dressed in jerseys and slacks. (Although sex of story character was counterbalanced, the systematic effects of this variable were not examined.)

For each story pair, the subject was shown pictures depicting two identical events, which were also described verbally (e.g., John is giving Bob a cupcake; Paul is giving Doug a cupcake). In addition, a different level of a given type of information was presented for each of the two events.[1] For example, if one story in a pair was accompanied by high-consensus information, the other was accompanied by low consensus. *Consensus* information took the form: (a) Almost everyone else (gives Bob a cupcake)—high; or (b) hardly anyone else (gives Doug a cupcake)—low. *Distinctiveness* information took the form: (a) (John) does not (give cupcakes) to anyone else—high; or (b) (Paul) also (gives cupcakes) to everyone else—low. *Consistency* information took the form: (a) In the past, (John) has always (given cupcakes to Bob)—high; or (b) in the past, (Paul) has never (given Doug a cupcake)—low.

Consensus information was portrayed pictorially by having a group of three persons performing the act or not performing it (e.g., all giving cupcakes—high; all withholding cupcakes—low). Distinctiveness information was depicted by the agent either performing the act toward a group of three persons or not performing it (e.g., John holding a tray of cupcakes out to the group—low; or holding it behind his back—high). Consistency information consisted of three panels showing the same act (e.g., John giving or not giving a cupcake to Bob), but with a clock in each panel showing a different time to indicate that the behavior had always or had never happened before (high and low, respectively). This general type of portrayal was used for all story pairs. Within each story pair, the act was portrayed in exactly the same way, except that the main characters had different colored hair and clothing.

All subjects were presented with three of the nine story pairs, each of which was accompanied by a different type of information. Nine subject groups, representing different Story Pair × Information combinations resulted from this procedure. An equal number of subjects of each age and sex appeared among the 16 subjects within each group. Four random orders of stories were administered to four subjects in each group.

Procedure

Each child was given the following instructions:

> I have some stories here that I'd like you to help me with. They are about boys (girls) just your own age. I'm going to read the stories to you while you look at the pictures. Then I'm going to ask you what you think about some of the characters in the stories. Do you have any questions? Okay, then let's start. . . . Here's the first one. . . .

The experimenter began with the first story of the pair, reading the main event, and then placing the picture of it at the subject's left. The experimenter then read the information and placed this picture underneath that of the main event. The second story of the pair was administered in the same way and was laid out at the subject's right. Right and left positions were counterbalanced in terms of which position contained the agent and the target to whom causal attributions were predicted. After the first time, the subject was asked to repeat the story to ensure comprehension and attention.

"Can you tell *me* the story now? What happened here (pointing to the pictures)?" If the subjects had difficulty recalling information or names, they were helped with it until they were given correctly.

Similar instructions, with appropriate modifications, were administered to adult subjects who performed the same task.

Dependent Measures

After hearing each story pair, the subject was asked to compare the two agents and the two targets. For the positive stories, the question was, "Who do you think is the nicer boy (girl): Agent 1 or Agent 2 (Target 1 or Target 2)?" For the negative stories, the question was, "Who do you think is the meaner boy (girl): Agent 1 or Agent 2 (Target 1 or Target 2)?" For the neutral stories, the question varied according to the content, for exam-

[1] Subjects were also presented with story pairs that provided two pieces of information for each member of the pair. However, due to counterbalancing of information types, some combinations of information were ambiguous in terms of which attribution (agent or target) would be predicted. Because analyses of these data revealed the same effects as those obtained for single pieces of information, it was decided to present only the latter for the sake of clarity.

ple, "Who do you think is the faster boy (girl)?" The dependent measures consisted of the agents and targets to whom subjects attributed these characteristics. It was assumed that the agent (or target) whom subjects said was meaner was viewed as more personally responsible for the negative act than was the other agent (or target) and likewise for the choice of the nicer, faster, etc., agent or target. Thus, it was predicted that the agent in a story that was accompanied by low-consensus, low-distinctiveness, or high-consistency information would be viewed as nicer, meaner, faster, etc., than the agent in the story accompanied by high-consensus, high-distinctiveness, or low-consistency information. On the other hand, it was predicted that the target person in a story accompanied by high-consensus, high-distinctiveness, or high-consistency information would be viewed as nicer, meaner, faster, etc., than the target person in a story accompanied by low-consensus, low-distinctiveness, or low-consistency information. This measure was employed because it seemed more comprehensible for young children than the typical attribution measure, that is, asking subjects whether the agent or target, within a particular story, caused the event to occur.

Results

For each story pair, the agent and target chosen by the subjects were compared to predictions based on Kelley's (1967) model. Choices that agreed with predictions were coded as 1s and those that did not were coded as 0s. The Monte-Carlo procedures of Grams and van Belle (1972) have verified the pooling of binary data in several ways as a means of assessing the effects of violations of the binomial assumption, and several studies (Murdoch & Ogilvie, 1968; Shultz et al., 1975) have supported this conclusion. In the present study, preliminary analyses of variance were performed in two ways, by pooling across subjects and pooling across story items, for both predicted agent and for predicted target attributions. Since both versions produced similar results, it was concluded that the analyses were robust against violations of the binomial assumption. Therefore, pooled observations were converted to proportions and subjected to arc sine transformations (Winer, 1962) before performing separate Age × Information type analyses of variance. Comparisons of the proportions of predicted attributions to chance were also performed for agent and target attributions using the Z statistic (see Table 1). Because the preliminary analyses of variance revealed no interpretable effects for sex of subject and story category, these variables are not discussed here.

The Covariation Principle

Consistency information. As expected, subjects from first grade through adulthood used the covariation evidence provided by consistency information in making agent attributions. Not only were predicted agent attributions significantly better than chance at each age, but also the linear trend analysis of variance revealed no significant age-related improvement, $F(1, \infty) = 1.34, p > .25$. Contrary to expectation, first graders did not use consistency information for making target attributions. Furthermore, although third and sixth graders did use consistency information to make the predicted target attributions, adults did not. Consequently, there was no significant linear improvement with age in the effects of consistency information on target attributions, $F(1, \infty) = 1.64, p > .25$.

Distinctiveness information. As predicted, the covariation evidence provided by distinctiveness information was used by all subjects to make agent attributions. Predicted agent attributions were significantly better than chance at each age, and there was no significant age-related improvement, $F < 1$.

Consensus information. Contrary to prediction, first graders did not use the covariation evidence provided by consensus informa-

Table 1: Percentage of Choices Agreeing with Predictions Based on Kelley's Model

Information type/ attribution	Grade 1	3	6	College
Consensus				
Agent	53	28**	67*	83**
Target	61	67*	61	86**
Distinctiveness				
Agent	81**	94**	92**	86**
Target	31*	44	50	69*
Consistency				
Agent	81**	83**	86**	92**
Target	39	78**	75**	56

Note: $n = 36$ in each cell. Significance levels are based on a two-tailed Z test for testing the difference of a proportion from chance.
*$p < .05$ difference from chance.
**$p < .01$ difference from chance.

tion to make target attributions. However, there was a significant linear improvement with age, $F(1, \infty) = 4.73, p < .05$, and performance was better than chance from third grade on.

The Discounting Principle

Distinctiveness information. As expected, first graders were not successful in using distinctiveness information to make target attributions. Unexpectedly, their predicted target attributions were significantly worse than chance, and it was not until adulthood that predicted target attributions given distinctiveness information exceeded chance. Consistent with this finding, the analysis of variance revealed a significant linear improvement with age in the effects of distinctiveness information on predicted target attributions, $F(1, \infty) = 10.88, p < .01$.

Consensus information. Neither first nor third graders successfully used consensus information to make predicted agent attributions. First graders' attributions did not differ from chance, and third graders' attributions were significantly worse than chance. Sixth graders and adults, on the other hand, were able to apply the discounting principle, and their predicted agent attributions, given consensus information, exceeded chance. The linear trend analysis of variance revealed a significant improvement with age in the effects of consensus information on predicted agent attributions, $F(1, \infty) = 13.96, p < .01$.

Consistency of Application

Covariation. To examine further the developmental changes in the ability to apply the covariation principle, the proportion of subjects within each age group who consistently applied this principle was determined (see Table 2).[2] To be coded as a consistent user, a subject had to make both the predicted agent attribution given distinctiveness information and the predicted target attribution given consensus information. A linear trend analysis of variance performed on the arc sine transformations of these proportions revealed no significant improvement with age in consistent application of the covariation principle, $F > 1$.

Table 2: Percentage of Subjects at Each Grade Who Apply the Various Causal Principles

Causal principle	Grade 1	Grade 3	Grade 6	College
Additivity	33	39	17	3
Inconsistency	56	50	50	42
Discounting	11	11	33	56
Covariation	61	64	53	75

Note. $n = 36$ in each cell.

Discounting. Within each age group, subjects' use of the discounting principle was examined. To be coded as a consistent discounter, a subject had to make both the predicted agent attribution given consensus information and the predicted target attribution given distinctiveness information. Subjects who made one of these predicted attributions, but not the other, were coded as "inconsistent responders," and subjects who made neither predicted attribution were coded as applying an "additive" principle. For this latter group of subjects the presence of a cause within the agent, signified by low-distinctiveness information augmented the attribution of a cause to the target rather than diminished it. Similarly, the presence of a cause within the target, signified by high-consensus information augmented rather than diminished the attribution of a cause to the agent. As indicated in Table 2, subjects were coded as employing either consistent or inconsistent discounting, or an additive principle.

A linear trend analysis of variance revealed a significant improvement with age in the ability to apply the discounting principle consistently, $F(1, \infty) = 23.24, p < .001$. Comparisons between the successive age groups revealed that third graders were no better than first graders, $t < 1$, while sixth

[2] Consistency information was not considered in determining who showed consistent use of the covariation principle because it was not applicable to discounting: In order to determine properly whether consistent application of the covariation principle was more frequent than consistent application of the discounting principle, it was necessary that both indexes be based upon the same types of information.

graders were significantly better than third graders, and adults showed still further improvement in the ability to apply the discounting principle, $t(\infty) = 1.98$, $p < .05$. Complementing the linear increase with age in consistent application of the discounting principle was a significant linear decrease with age in consistent application of the additive principle, $F(1, \infty) = 17.59$, $p < .001$. Comparisons between the successive age groups revealed that third graders were no less likely than first graders to apply an additive principle, $t < 1$, while sixth graders were less likely than third graders to apply this principle, $t(\infty) = 2.12$, $p < .05$, and adults were even more unlikely than sixth graders to do so, $t(\infty) = 2.13$, $p < .05$. There was no significant age-related trend in inconsistent responses, $F(1, \infty) = 1.28$, $p < .25$.

Covariation Versus Discounting

A 2 × 4 (Causal Principle × Age) analysis of variance on the proportion of subjects who manifested consistent application of the discounting and covariation principles revealed a main effect for principle, $F(1, \infty) = 43.51$, $p < .001$, reflecting more consistent users of the covariation (.63) than the discounting principle (.28). However, a significant Age × Causal Principle interaction, $F(3, \infty) = 3.34$, $p < .05$, revealed that the advantage of the covariation principle diminished with increasing age. Although there were more consistent users of the covariation than discounting principle among first and third graders, $t(\infty) = 4.74$ and 5.00, both ps $< .01$, the proportion of sixth graders and adults who consistently applied the covariation principle did not differ significantly from the proportion who consistently applied the discounting principle, $t(\infty) = 1.73$ and 1.71, both ps $> .05$ (see Table 2).

Other Findings

The hypothesis that consensus provides less direct information about causes in the agent than either distinctiveness or consistency information was supported by a significant information main effect, $F(2, \infty) = 22.14$, $p < .01$. Predicted agent attributions were less frequent given consensus than either distinctiveness or consistency information, which did not differ from each other (.57 vs. .88 and .85, respectively, both ps $< .01$). Similarly, the hypothesis that distinctiveness provides less direct information about causes in the target than either consensus or consistency information was also supported by a significant information main effect, $F(2, \infty) = 6.84$, $p < .01$. Predicted target attributions were less frequent given distinctiveness than given either consensus or consistency information, which did not differ from each other (.49, vs. .59 and .66, ps $< .01$ and .05, respectively).

A post hoc comparison revealed that people were more likely to make predicted agent than predicted target attributions, .77 versus .60, $t(\infty) = 5.43$, $p < .001$.

Discussion

The present investigation has revealed several interesting developmental trends in the ability to use distinctiveness, consensus, and consistency information for making causal attributions. Consistent with other developmental research on covariation and discounting, the application of a covariation principle using this information was present at a younger age than the application of a discounting principle. The question remains as to why this is so. One explanation that has been suggested (Shultz et al., 1975; Smith, 1975) is that young children are unable to "decenter," that is, to attend to several factors or dimensions of a problem simultaneously and to integrate these factors when making a judgment (Inhelder & Piaget, 1958, 1969; Piaget, 1930). Although application of the covariation principle requires attending to only one plausible cause for an effect—a cause in either the agent or the target—application of the discounting principle requires attending to and integrating two plausible causes for an effect. Information about the presence or absence of one cause must be used to infer the presence or absence of another.

Although the discounting-decentering analogy seems plausible, the present findings do not support this explanation. Even among the youngest subjects, informa-

tion about one cause did not always yield random inferences about the other, which is what one would expect if subjects could only process information about one cause. Rather, for approximately half of the first and third graders, information about one cause yielded systematic inferences about the other. However, the systematic inference most frequently shown by these younger subjects differed from that of adults. Approximately one third of them employed an additive principle: Information indicating that a cause was present within the agent (or target) augmented, rather than diminished, their inference that the other plausible cause was also present. It is important to note that this additivity does not merely reflect a kind of response perseveration, that is, causal attribution to the target who is in the same story as the agent to whom an attribution has just been made. To be counted as manifesting additivity, subjects also had to apply this principle in their initial attribution for an effect, that is, their agent attributions given consensus information.

The discovery that more younger children applied an additive than a discounting principle when making either agent attributions on the basis of consensus information or target attributions on the basis of distinctiveness information is consistent with results reported by Karniol and Ross (1976). These authors found that younger children tended to use an additive rather than a discounting principle in judging whether a child who played with a toy in the presence of external causes had been internally motivated to do so. They suggested that this may be due to young children's view of rewards: "Conceivably, while adults and older children tend to view rewards as 'bribes,' some of the younger children tend to view them simply as "bonuses" for undertaking the activity" (p. 463). However, the finding that younger children applied an additive principle in the present paradigm, where interpretation of rewards was not an issue, suggests that a more basic developmental trend in information processing is operating. More specifically, the additivity of the younger children seems to reflect the use of what Weiner and Kun (1976) have labeled a *halo schema*. When "niceness" or "meanness" is attributed to the agent of an action on the basis of distinctiveness information, it is also attributed to the target. Similarly, whatever characteristic is attributed to the target on the basis of consensus information is also attributed to the agent. Thus, the agent's "halo" rubs off on the target, and vice versa. By the same token, the halo of the external cause may rub off on the internal motivation in the Karniol and Ross paradigm.

An unexpected finding in the present study was a general tendency for performance to be poorer on the target than the agent attribution task. Not only were predicted agent attributions more frequent overall, but also the ability to apply both the covariation and the discounting principles was present at younger ages for agent than for target attributions. Although first graders could apply the covariation principle to make agent attributions on the basis of distinctiveness information, only the older age groups could successfully apply the covariation principle to make target attributions on the basis of consensus information. That these results do not reflect greater difficulty in utilizing consensus than distinctiveness information becomes apparent when applications of the discounting principle are examined. Although sixth graders could apply the discounting principle to make agent attributions on the basis of consensus information, only adults could successfully apply the discounting principle to make target attributions on the basis of distinctiveness information.

The greater difficulty in making predicted target than agent attributions is consistent with earlier research (McArthur, 1972, 1976) which found significantly less attribution to targets than agents. One possible explanation for these results is that the target attribution question always came second. Although the pictorial depiction of the story information ensured that it would not be differentially recalled during the first and second attribution questions, Ruble and Feldman (1976) have demonstrated order effects when recall was not at issue. Thus the possibility of an order effect merits further investigation, as does the possibility that

people of all ages are more likely to make systematic inferences about causes in the agent of an effect than about causes in the target.

Given the differences in methodology, the similarity of the present findings to earlier research (e.g., McArthur, 1972, 1976; Orvis, Cunningham, & Kelley, 1975) that obtained adults' attributions for one-sentence descriptions of a single action is noteworthy. In addition, the story format has provided information not available from earlier paradigms. For example, the present study indicates that the relatively weak impact of consensus information in earlier research is not solely a consequence of its "abstractness" in comparison with more "vivid" distinctiveness information, as has been suggested (e.g., Nisbett & Borgida, 1975). Because the story pictures depicted all of the information in an equally concrete fashion, the weaker effect of consensus than distinctiveness information on agent attributions must reflect its content, namely, its revelation of covariation of an effect with the target rather than the agent.

From early childhood onward, individuals are confronted with interpersonal situations that require inferences about the causes of behavior. Since developmental differences in causal inferences may have important implications for social interaction, it would be useful to investigate the generalizability of the present findings to real social situations. For example, in making causal inferences about hypothetical story characters, young children perceived the target of a "bully's" aggression as "meaner" than the target of a more discriminating aggressor, while the reverse was true for adults. It would be interesting to investigate whether this developmental difference holds true for evaluations of victims in more realistic aggression situations.

REFERENCES

Anderson, N. H. Cognitive algebra: Integration theory applied to social attribution. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 2). New York: Academic Press, 1974.

Grams, W., & van Belle, G. Departures from binomial assumptions in short-term memory models. *Psychometrika*, 1972, *37*, 137–141.

Heider, F. *The psychology of interpersonal relations*. New York: Wiley, 1958.

Inhelder, B., & Piaget, J. *The growth of logical thinking from childhood to adolescence*. New York: Basic Books, 1958.

Inhelder, B., & Piaget, J. *The early growth of logic in the child*. New York: Norton, 1969.

Karniol, R., & Ross, M. The development of causal attributions in social perception. *Journal of Personality and Social Psychology*, 1976, *34*, 455–464.

Kelley, H. H. Attribution theory in social psychology. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (Vol. 15). Lincoln: University of Nebraska Press, 1967.

Kelley, H. H. The processes of causal attribution. *American Psychologist*, 1973, *28*, 107–128.

McArthur, L. A. The how and what of why: Some determinants and consequences of causal attribution. *Journal of Personality and Social Psychology*, 1972, *22*(2), 171–193.

McArthur, L. Z. The lesser influence of consensus than distinctiveness information on causal attributions: a test of the person–thing hypothesis. *Journal of Personality and Social Psychology*, 1976, *33*, 733–742.

Murdock, B. B., & Ogilvie, J. C. Binomial variability in short-term memory. *Psychological Bulletin*, 1968, *70*, 256–260.

Nisbett, R., & Borgida, E. Attribution and the psychology of prediction. *Journal of Personality and Social Psychology*, 1975, *32*, 932–943.

Orvis, B., Cunningham, J., & Kelley, H. A closer examination of causal inference: the roles of consensus, distinctiveness, and consistency information. *Journal of Personality and Social Psychology*, 1975, *32*, 605–616.

Piaget, J. *The child's conception of physical causality*. London: Routledge & Kegan-Paul, 1930.

Ruble, D., & Feldman, N. Order of Consensus, Distinctiveness and Consistency Information and Causal Attributions. *Journal of Personality and Social Psychology*, 1976, *34*, 930–937.

Shaklee, H. L. *Inferring ability and task difficulty: A developmental study*. Unpublished master's thesis, University of Oregon, 1974.

Shultz, T. R., & Mendelson, R. The use of covariation as a principle of causal analysis. *Child Development*, 1975, *46*, 394–399.

Shultz, T., Butkowsky, I., Pearce, J., & Shanfield, H. Developmental schemes for the attribution of multiple psychological causes. *Developmental Psychology*, 1975, *11*, 502–510.

Siegler, R. S., & Liebert, R. M. Effects of contiguity, regularity and age on children's causal inferences. *Developmental Psychology*, 1974, *10*, 574–579.

Smith, M. C. Children's use of the multiple sufficient cause schema in social perception. *Journal of Personality and Social Psychology*, 1975, *32*, 737–747.

Weiner, B., & Kun, A. The development of causal attributions and the growth of achievement motivation. In S. Feldman & D. Bush (Eds.), *Cognitive development and social development*. Hillsdale, N. J.: Erlbaum Press, 1976.

Winer, B. J. *Statistical principles in experimental design*. New York: McGraw-Hill, 1962.

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