Published in final edited form as:

J Cogn Dev. 2004 August ; 5(3): 359–382. doi:10.1207/s15327647jcd0503_4.

When to Cry Over Spilled Milk: Young Children's Use of Category Information to Guide Inferences About Ambiguous Behavior

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Abstract

Three studies ($N = 171$) examined preschool children's tendency to use category information to make inferences about ambiguous behavior. Children heard stories in which category information about story characters was manipulated and behavioral information was held constant. Participants were asked to evaluate, explain, and determine the significance of the behavior in question. Children tended to be harsher judges of the same ambiguous behaviors when performed by (a) humans as compared to animals, (b) boys compared to girls, and (c) older children compared to younger children. Results suggest that young children hold differentiated notions of the mental states and dispositions that underlie behavior and that these notions vary as a function of category membership. These findings support the conclusion that even young children can hold and use multiple folk psychologies.

One challenge that individuals face in social interaction is determining the meaning of behavior that they observe. One reason this determination can be difficult is that the mental states that drive behavior are not always obvious. For example, there are several reasons that a child might ask lots of questions: He or she might love learning, or might be attempting to annoy someone, or might simply be confused by the subject matter (see Heyman, 2001). Understanding how children resolve such ambiguity is important because the nature of their interpretations has important consequences for social and emotional development (see Dodge, 1986). For example, making consistently hostile interpretations of ambiguous behavior is associated with a variety of social difficulties, including peer rejection (see Coie & Dodge, 1998).

How might children make sense of behavior when the intention behind it is ambiguous? Children's patterns of generalized beliefs about people, such as their beliefs about traits or social categories, might serve as one possible tool for interpreting social behavior (Heyman & Gelman, 1999; Piaget, 1954; Shaver, 1985; see also Jones & McGillis, 1976). Despite evidence that children's trait reasoning undergoes substantial development during the elementary school years (see Ruble & Dweck, 1995), Heyman and Gelman (1999) recently showed that children as young as 4 years of age can use trait labels such as *mean* or *shy* when making mental state inferences about behavior. For example, they found that 4-year-olds inferred that a shy character was less likely than a not-shy character to be pleased upon encountering many people on an outing. This study focuses on whether young children might similarly be able to use social category information to guide their psychological inferences about behavior.

This research extends previous work on children's use of information about generalized characteristics to guide psychological inferences by examining the ways in which preschool-age children use information about social categories such as species, age, and gender as tools for resolving uncertainty. A substantial body of research has demonstrated that young children

are aware of the existence of social categories and that they view such categories as informative. For example, even preschool-age children readily make inferences about a person's behavioral and biological properties based on information about gender (Gelman, Collman, & Maccoby, 1986). Of interest in this article is whether information about category membership might drive young children's inferences about the psychological correlates of behavior, such as intention.

SPECIES

A central question in this article is whether preschool children might find the distinction between humans and animals to be relevant when reasoning about ambiguous behavior. The extent to which reasoning about people is unique has been subject to considerable debate over the last several decades (Carey, 1985; Heyman & Gelman, 2000; Marini & Case, 1989; Piaget, 1929; Rotenberg, 1982; Spelke, Phillips, & Woodward, 1995). Whereas social cognition has traditionally been defined in terms of "cognition and knowledge about *people* [italics added] and their doings" (Flavell & Miller, 1998, p. 851), this article examines how children's reasoning about the psychology of people compares to their reasoning about the psychology of other animate beings. This question is anchored in a larger debate regarding the entities that children view as having a mental life (Piaget, 1929).

Historically, there has been a great deal of interest in children's reasoning about the mental states of various entities in their environment. Piaget (1929) argued that young children often make appeals to the intentional states of inanimate objects, suggesting that young children are likely to ascribe a human-like psychology to nonhuman animals. Consistent with this possibility, Carey (1985) argued that young children apply their developing understanding of people when reasoning about the characteristics of nonhuman animals. However, there is some reason to suspect that young children do have differentiated notions of the dispositional characteristics of animals and people; evidence suggests that from an early age, children have different category-driven schemas for people than for animals (Bowd, 1982; Gelman & Gottfried, 1996; Hall & Waxman, 1993). For example, children as young as kindergarten age have concepts of the capabilities of human beings that are distinct from those of animals, such as the notion that humans can produce food, whereas animals generally cannot (Bowd, 1982).

In this study we address whether children make distinctions between people and animals when reasoning in the psychological domain. In particular, we examine whether children might make different psychological inferences about the behavior of people than about the behavior of pets. Children's reasoning about pets is an important arena for research because of pets' ubiquity in children's social worlds. More than 75% of children in the United States live with pets in the home; children are now more likely to live with a pet than with both parents (Melson, 2001; see also Fifield & Forsyth, 1999). In addition, children's reasoning about pets is of theoretical interest because it potentially demands consideration of both biology and psychology: Pets are both animals (a biological category) and social companions (a social category; see Hickling & Wellman, 2001, and Schult & Wellman, 1997, for discussions).

To investigate children's use of a categorical distinction between humans and pets, we compared inferences about the ambiguous behavior of children versus dogs. Dogs were chosen as a starting point for looking at these issues because they are a common household pet with which children are likely to have a great deal of experience (Carey, 1985; Melson, 2001) and because dogs engage in many behaviors similar to human behaviors, such as playing with toys and children and knocking things over.

GENDER

Gender is a highly salient category, one that older children and adults use to make a wide range of nonobvious inductive inferences (Maccoby, 1988; Martin, 1989; Rothbart & Taylor,

1992). There is evidence that gender is a salient category very early in development (Bussey & Bandura, 1992; see Huston, 1985, and Ruble & Martin, 1998). For example, even 2-year-olds systematically distinguish male from female with regard to traits, emotions, and trait-relevant behavior (Cowan & Hoffman, 1986; Kuhn, Nash, & Bruckner, 1978; Serbin, Powlishita, & Gulko, 1993). Children as young as preschool age realize that gender categories go beyond perceptual appearances and capture important similarities and differences between people (Gelman, Collman, & Maccoby, 1986).

Some evidence indicates that gender information helps older children and adults to resolve uncertainty about mental states and psychological characteristics (Condry & Condry, 1976; Heyman, 2001; Zalk & Katz, 1978). For example, Heyman found that second and third graders tended to evaluate ambiguous behavior by a male story character as more “bad” than the identical behavior by a female character. We predict that, like older children, preschool-age children will judge the behavior of boys more harshly than the behavior of girls.

AGE

Developmental psychopathologists have emphasized the need to consider the age of a child in determining the severity and greater significance of behavior (see Wenar & Kerig, 2000). Dix, Ruble, Grusec, and Nixon (1986) found that adult participants were similarly inclined to take age information into account when interpreting the behavior of children. There is also evidence that elementary school age children hold different expectations for older versus younger children and can modify their behavior in response to the perceived age of peers (French, 1984; Musser, Graziano, & Moore, 1987). For example, children as young as first graders expect younger children to be less competent than older children in both academic and social activities (French, 1984). Of interest in this study is whether pre-school-age children, like older children and adults, are capable of using age information to interpret behavior.

Evidence suggests that even young children are sensitive to age information in some contexts (Lampinen & Smith, 1995; Shatz & Gelman, 1973; Taylor, Cartwright, & Bowden, 1991; Tomasello & Mannle, 1985). Lampinen and Smith found that preschool children were more likely to be misled by an adult than by a child. Taylor et al. (1993) found that by 5 years of age, children understand that adults are more useful sources of certain kinds of information than are children. Studies 2 and 3 included manipulations of age information to examine whether this would affect children’s reasoning. We expected that children would generally be more judgmental when evaluating the actions of older characters, perhaps because they have some understanding that older individuals are held up to more stringent behavioral standards.

STUDY 1

Study 1 examined preschool children’s use of category information to guide their inferences about ambiguous behavior. Children’s reasoning was investigated with reference to a character who “spills your milk” (Erdley & Asher, 1998). This behavior was selected because (a) it is understandable to preschoolers, (b) it offers multiple plausible interpretations, and (c) it can be performed by both people and dogs.

Each participant heard two scenarios, one in which a puppy “spills your milk” and one in which the same action is performed by a child. One question of interest was how young children’s inferences might differ if the actor were a person or a dog. A second question of interest was how young children’s inferences might vary as a function of the presentation of gender information.

Method

Participants—Ninety preschool children participated (45 boys and 45 girls; *M* age = 4 years 8 months, range = 4 years 0 months–5 years 11 months). Twenty were African American, 20 were Asian American, 12 were European American, and 38 were Hispanic American. Participants were recruited from two low-income, ethnically diverse Head Start Centers in urban areas of San Diego County.

Stimuli—Two vignettes were presented in random order. Each vignette described a scenario in which a person or a dog performed an action. Names of characters were randomly selected without replacement from a list of masculine, feminine, or dog names to ensure that particular name associations did not affect results (see Kasof, 1993). Main characters in each story were represented by brown wooden figures (a ½ in. cube with a ½ in. diameter sphere glued on top, with black dots representing eyes). When representing a person, the figure was presented upright; when representing a dog, the figure was laid on its side. Vignette 1 read, “[The story character] is a new kid in class. [He or she] knocked over your milk and spilled it all over the place.” In Vignette 1, half the participants heard scenarios involving male characters, and the other half received female characters. Vignette 2 was identical, except that the character was described as a puppy instead of a new kid in class.

Procedure—Participants were interviewed individually. Following each vignette, children were given a series of three measures. The explanation measure appeared first, and then the other two measures appeared in random order.

Explanation: Participants were asked, “Why did [the story character] do this?” Children who were unable to generate a response were gently encouraged to “think of a reason why [the story character] might have done this.”

Responses to this question were coded three ways. First, responses were given a valence score: negative explanations were given a 1 (e.g., “Because he hates me”; “Because she is mean”); neutral (“Because he runs”; “He is a dog”) or positive (“Because he was trying to help me”; “He is a good friend and didn’t even mean to”) explanations were given a 0. Responses such as “He wanted to spill milk” were considered neutral explanations because it is possible that children who said this meant that the character spilled milk as a type of sensorimotor play. Vague or *don’t know* responses were scored a 0.

Second, responses were coded for reference to intent. Responses either contained intent language (e.g., “tried to,” “wanted to”) or did not. Responses that did not reference intent at all were coded as containing no intent language (“He is big”; “She runs”); responses containing intent language were coded as containing general intent language. Following this initial classification, all responses falling into the general intent language category were placed into one of two possible subcategories: Responses in which the character was described as deliberately spilling the milk (“She wanted to do it”; “He did it on purpose”) were classified as containing reference to deliberate intent, and responses that referred to intent to do something tangential to spilling milk (“She was trying to help me”; “He was trying to run”) were classified as containing reference to tangential intent. This coding scheme was designed to explore the ways participants might use general intent language differently as a function of category information. For example, might participants use general intent language with equal frequency across categories but reserve reference to deliberate intent for members of particular categories?

Third, responses were coded as to whether they contained evidence of the use of evaluative trait words (“She is bad”; “He is mean”). Cohen’s kappa was .95 or greater for all three methods of coding. Discrepancies were resolved through discussion.

Severity: Participants were asked, “How bad is the thing that [the story character] did? Was it not bad at all, a little bad, or very bad?” A *not bad at all* response was scored as 0, a *little bad* was scored as 1, and *very bad* was scored as 2.

Generalizability: Participants were asked to predict the story character’s behavior in another context. Specifically, they were asked, “Does [the story character] also hurt people by knocking them down?” A *no* response scored as 0, and a *yes* response was scored as 1.

Results and Discussion

Initial Analyses—No significant effects of age of participant, participant gender, or vignette order were found, and so these variables were dropped from further analysis. Table 1 presents an overview of results.

Explanation—Three components of responses to the explanation measure were analyzed: valence of responses, reference to intent, and use of evaluative trait words. For these and all categorical data, loglinear analyses were conducted to account for the within-subjects nature of the data (see Landis & Koch, 1979).

Valence: Examination of the valence of responses revealed that participants were more likely to provide negative explanations for the behavior of children compared to that of dogs, $G^2(1) = 11.16, p < .001$. Participants did not differentiate between boys and girls in their tendency to provide negative explanations.

Reference to intent: Participants used general intent language (“tried to,” “wanted to”) with equal frequency across child and dog scenarios, 19% versus 14% of the time, $G^2(1) = 0.64, p > .20$. However, participants who used general intent language were more likely to provide reference to deliberate intent (e.g., “She wanted to spill the milk”) when explaining the child’s actions than when explaining the dog’s actions, 47% versus 0% of responses containing general intent language, $G^2(1) = 11.46, p < .001$. These findings support the conclusion that it is not the case that young children simply use general intent language more frequently when talking about people; rather, they appear to view people as more likely than dogs to have deliberately caused a negative outcome. There was no effect of gender on this measure.

Use of evaluative trait words: Participants were more likely to use evaluative trait words when explaining the child’s actions than when explaining the actions of the dog (“He is mean”), $G^2(1) = 4.03, p < .05$, suggesting that they have some awareness that the dispositional characteristics that underlie behavior differ as a function of the particular sort of entity engaging in the behavior. For example, children were unlikely to report that a dog spilled milk because it was a bully or because it was mean, whereas such remarks were evident in their explanations of the behavior of children. No gender effect was evident.

Severity—Collapsing across character gender, a within-subjects analysis of variance (ANOVA) on severity judgments revealed a significant effect of species, with children’s behavior evaluated as more severe than that of dogs, $M = 1.48$ versus $.97$ out of 2, $F(1, 89) = 34.59, p < .0001$. A between-subject ANOVA on severity judgments in the person scenarios revealed a significant effect of gender, with participants evaluating the behavior of boys more harshly, $M = 1.62$ versus 1.33 out of 2, $F(1, 88) = 3.9, p < .05$.

Generalizability—Examination of participants’ tendency to generalize behavior to novel situations revealed a significant effect of species, with participants viewing the behavior of children as more generalizable than the behavior of dogs, $G^2(1) = 7.64, p < .01$. Participants

viewed the behavior of girls as only marginally less generalizable than that of boys, $G^2(1) = 3.69, p < .06$.

Relations Among Measures—Analyses of the relations among measures indicated that children's estimates of the severity of behavior were correlated with their estimates of the generalizability of behavior, $r(88) = 0.44, p < .001$. This correlation suggests that children who view ambiguous behavior in a negative light are especially likely to expect consistency in other contexts.

Summary—Study 1 provides preliminary evidence that preschool children make important distinctions between children and animals and between boys and girls when reasoning about the same behavior. Participants were more likely to use evaluative trait words, provide negative explanations, and refer to deliberate intent when explaining a child's actions than when explaining a dog's actions. They also evaluated the behavior of children as more severe and more generalizable to different contexts. These findings suggest that preschool children may hold dogs less liable than children for their actions. Study 1 also revealed that preschool children used information about gender to evaluate behavior, rating the behavior of boys as more severe than the behavior of girls (see Heyman, 2001, for related findings).

STUDY 2

Study 2 was designed to replicate the results of Study 1 and to examine whether children's general inferences would extend beyond references to overt behavior. This question is of particular interest in light of recent evidence that young children can use trait-relevant information to draw mental state inferences (Heyman & Gelman, 1998). Yuill (1992) argued that one way to get a better understanding of the extent to which children's notions of the mind are theory-like is to investigate their ability to connect information about dispositions with information about mental states such as emotions, beliefs, and desires. Accordingly, Study 2 asks children to reason about the mental states of category members.

An additional goal of Study 2 was to investigate the role of age information in guiding children's inferences. One reason for this goal was to examine whether young children, like adults (Dix et al., 1986), might use age in their social inferences about children. A second reason for this goal was to clarify the meaning of findings in Study 1. Although results were interpreted in terms of a person–dog distinction, these results possibly might reflect perceived differences in developmental level. For example, perhaps the use of the word *puppy* made developmental level more salient to children. Study 2 tests such a possibility by explicitly manipulating the age of both child and dog story characters.

Method

Participants—Forty-one preschool children (21 boys and 20 girls; M age = 4 years 8 months, range = 4 years 1 month–5 years 2 months) participated in Study 2; they were recruited from the same Head Start Centers as in Study 1. Ten were African American, 7 were Asian American, 2 were European American, and 22 were Hispanic American. None had participated in Study 1.

Procedure—The procedure in Study 2 paralleled that of Study 1, with a few exceptions. In six scenarios, participants were told that the character “knocked over your milk and spilled it all over the place.” These scenarios included two dog scenarios, with age manipulated as a within-subjects variable (puppy vs. grown-up dog); two girl situations, with age manipulated as a within-subjects variable (3-year-old girl vs. 8-year-old girl); and two boy situations, with

age manipulated as a within-subjects variable (3-year-old boy vs. 8-year-old boy). These scenarios were presented in random order.

As in Study 1, wooden figures were used to assist children in focusing on the task. When describing younger characters, the ½ in. figures from Study 1 were used. When describing older characters, 1 in. cubes with 1 in. diameter spheres were used.

After presentation of each scenario, participants were asked a series of questions. Two questions were identical to those questions asked in Study 1 (explanation and severity). The explanation measure was coded as in Study 1; Cohen's kappa was greater than .97 for all methods of coding. The generalizability question was omitted in Study 2; instead, two new questions assessed children's tendency to draw general conclusions

Mental state inference: Participants were asked to predict, "Does [the story character] like to make people mad?" *Yes* responses were coded as 1, and *no* responses were coded as 0.

Stability inference: Participants were asked, "Will [the story character] always act this way?" to assess whether they believed that the story character's behavior would be stable over time. *Yes* responses were coded as 1, and *no* responses were coded as 0.

The explanation measure was always presented first, and the other three measures were presented next in random order.

Results and Discussion

Initial Analyses—As in Study 1, no significant effects of age of participant, participant gender, or vignette order were found, and so these variables were dropped from further analysis. Table 2 presents an overview of results.

Explanation—Loglinear analyses of children's responses to the open-ended explanation measure yielded three sets of findings with regard to valence, reference to intent, and the use of evaluative trait terms.

Valence: Loglinear analyses of the valence of children's responses revealed a significant main effect of species, with more negative explanations provided for the behavior of children, $G^2(1) = 34.00, p < .0001$; of age, with more negative explanations provided for the behavior of older characters, $G^2(1) = 5.03, p < .05$; and of gender, with more negative explanations provided for the behavior of boys, $G^2(1) = 8.78, p < .01$. No significant interactions emerged. Further analysis revealed that participants did not differentiate between girls and dogs in their tendency to provide negative explanations.

Reference to intent: Participants did not differentiate across age, species, or gender in their use of general intent language ("try to," "want to," "decide to"). However, consistent with the results of Study 1, participants were more likely to provide reference to deliberate intent when explaining the actions of children than of dogs, $G^2(1) = 5.10, p < .05$. No other significant effects were evident.

Use of evaluative trait words: Examination of participants' spontaneous use of evaluative trait language ("He is a bully") revealed a significant main effect of species, with participants more likely to use evaluative trait words when explaining the actions of people as compared to dogs, $G^2(1) = 13.10, p < .001$; of character age, with participants using such words more frequently to explain the behavior of older characters, $G^2(1) = 5.73, p < .05$; and of gender, participants using evaluative trait words more frequently to explain the behavior of boys, $G^2(1) = 5.84, p < .05$. No significant interactions were evident. Participants were only

marginally more likely to use evaluative trait terms when explaining the actions of girls than when explaining the actions of dogs, $G^2(1) = 2.86, p < .09$.

Severity—Children's estimates of the severity of behavior were analyzed using a 2 (age: older, younger) $\times$ 3 (character type: dog, boy, girl) within-subjects ANOVA. Results revealed a significant effect of character age, with the behavior of older characters evaluated as more severe than the behavior of younger characters, $M = 1.24$ versus $.89, F(1, 80) = 27.85, p < .0001$; and of character type, $F(2, 80) = 31.88, p < .001$. A priori contrasts revealed that participants evaluated the children's behavior as more severe than the behavior of dogs, $M = 1.23$ versus $.72$ out of 2, $F(1, 80) = 44.83, p < .0001$, and the behavior of male characters as more severe than that of female characters, $M = 1.50$ versus $.96, F(1, 80) = 49.17, p < .0001$. Participants also rated the behavior of dogs as less severe than the behavior of girls, $M = .72$ versus $.96, F(1, 80) = 10.17, p < .01$. No significant interactions emerged.

Mental State Inference—Analyses of participants' responses to the mental state inference measure revealed a significant main effect of species, with participants viewing children as more likely than dogs to enjoy making people mad, $G^2(1) = 40.99, p < .0001$; and of gender, with participants more likely to make such mental state inferences based on the behavior of boys than of girls, $G^2(1) = 27.72, p < .0001$. No effect of character age emerged, and there were no significant interactions. Further analyses revealed that participants inferred that girls were more likely than dogs to enjoy making people mad, $G^2(1) = 9.62, p < .01$, suggesting that the effect of species information on mental state inferences is not simply an effect of children's reasoning about boys. This finding is of note because it suggests that children have notions of the mental states that underlie behavior that are differentiated according to the nature of the particular actor in question.

Stability Inference—Analyses of children's stability inferences revealed that they viewed the behavior of people as more likely to persist into the future than the behavior of dogs, $G^2(1) = 8.48, p < .01$. In addition, analyses revealed a main effect of character age, with older characters' behavior seen as more stable than that of younger characters, $G^2(1) = 7.53, p < .01$; and a main effect of gender, with boys' behavior viewed as more stable than girls' behavior, $G^2(1) = 7.59, p < .01$. No significant interactions emerged. Participants did not differentiate between dogs and girls when estimating the stability of behavior.

Relations Among Measures—Analyses of the relations among measures, summing over the six scenarios, suggested some degree of coherence across responses. For example, participants' severity estimates were correlated with their mental state inference scores, $r(39) = .43, p < .01$, such that children who tended to evaluate behavior as especially bad also tended to report that characters liked to make people mad. In addition, participants' stability scores were correlated with their mental state inference scores, such that children who believed behavior to be stable were more likely to report that characters liked to make people mad, $r(39) = 0.49, p < .01$.

Summary—As in Study 1, preschool children's evaluations of events, and their generalizations based on those events, were generally more negative regarding people than regarding dogs. Also consistent with the results of Study 1, participants generally made more negative inferences about boys than about girls. Study 2 also demonstrates that participants evaluated the behavior of older characters more harshly than the behavior of younger characters. Finally, the results of Study 2 suggest that preschool children use category information to make inferences about emotional states, which contributes to a growing body of literature suggesting that even young children can reason about the link between overt

behavior and the more subtle emotions and motivations that underlie behavior (e.g., Lagattuta & Wellman, 2001).

STUDY 3

A primary goal of Study 3 was to examine whether the findings in Studies 1 and 2 would replicate if different examples of ambiguous behaviors were used. To address this goal, two new behaviors were included, adapted from a set of ambiguous situations used by Dodge and colleagues (Dodge, 1980; Dodge & Frame, 1982) in studies of attributional biases in older children. A second goal of Study 3 was to explicitly test the possibility that children might be more likely to attribute intent to certain actors than to others. To this end, we asked children whether they believed a story character's actions were on purpose or accidental (see Piaget, 1965).

Method

Participants—Forty preschool children participated in Study 3 (24 boys and 16 girls; *M* age = 4 years 8 months, range = 3 years 10 months–5 years 3 months) recruited from the same Head Start Centers as in Study 1 and 2. Eight were African American, 7 were Asian American, 4 were European American, and 21 were Hispanic American. None of the participants in Study 3 had participated in either Study 2 or Study 1.

Procedure—The procedure in Study 3 generally paralleled that of Study 2. Twelve scenarios, presented in random order, were included: four dog scenarios, four girl scenarios, and four boy scenarios. Age was manipulated as in Study 2. In half the scenarios for each type of character, participants were told that the character “tore your picture,” and in the other half, they were told that the character “messed up your puzzle.” Wooden figures were used as in Study 2.

After presentation of each scenario, participants were asked three questions from Study 2: severity, stability, and mental state inference. In Study 3, the stability question read, “Does [the story character] always act this way?” One new question was included that was designed to assess children's tendency to infer that a character had acted purposefully or accidentally. Question order was randomized within each scenario.

Explanation: In this question, participants were asked to determine whether the story character committed an act on purpose. For example, in the torn picture scenario, participants were asked, “Did [the story character] tear your picture by accident, or did [the story character] try to tear your picture?” These choices were presented in random order.

Results and Discussion

Initial Analyses—Initial analyses revealed no significant effect of gender or age of participant or of story type, so these variables were dropped from further analysis. Table 3 presents an overview of results.

Severity—Children's severity judgments were analyzed using a 2 (age: older, younger) $\times$ 3 (character type: boy, girl, dog) within-subjects ANOVA. In this analysis, responses were averaged across story type. Results revealed a main effect of character age, with the behavior of older characters rated as more severe, $M = 1.26$ versus $.93$, $F(1, 78) = 21.03$, $p < .0001$; and a main effect of character type, $F(2, 78) = 8.10$, $p < .001$. A priori contrasts revealed that participants rated the behavior of people as more severe than the behavior of dogs, $M = 1.15$ versus $.99$, $F(1, 78) = 8.28$, $p < .01$, and that they rated the behavior of male characters as more severe than the behavior of female characters, $M = 1.28$ versus 1.03 , $F(1, 78) = 19.83$, $p < .$

0001. No significant interactions emerged. Children did not differentiate between girls and dogs in their estimates of severity.

Mental State Inference—Loglinear analyses of children's tendency to make mental state inferences revealed a significant main effect of species, with participants viewing children as more likely than dogs to enjoy making people mad, $G^2(1) = 20.48, p < .0001$; a significant main effect of age, with older characters viewed as more likely to enjoy making people mad, $G^2(1) = 10.05, p < .01$; and a significant effect of gender, with boys viewed as more likely than girls to enjoy making others mad, $G^2(1) = 6.27, p < .05$. No significant interactions emerged. Participants viewed girls as more likely than dogs to enjoy making people mad, $G^2(1) = 7.10, p < .01$, suggesting that the effect of species information on children's mental state inferences is not entirely the result of an effect of reasoning about boys.

Stability—Loglinear analysis of stability scores revealed a significant main effect of character age, with participants viewing the behavior of older characters as more stable over time, $G^2(1) = 17.93, p < .0001$. There was also a significant effect of species, although the direction was the opposite of that observed in Studies 1 and 2: Participants viewed the behavior of dogs as more stable over time than the behavior of people, $G^2(1) = 10.17, p < .01$. One possible reason for this discrepancy could be that in Study 3, the stability question asked, "Does [the story character] always act this way?" whereas in Studies 1 and 2 the wording was "Will [the story character] always act this way?" It is possible that children view dogs as more likely to always behave similarly to a target behavior in the present, and view people as more likely to behave similarly in the future, but this is an empirical question for future research. There was no significant effect of character gender and no significant interactions.

Explanation—In Study 3, children were explicitly asked whether the story character committed a transgression on purpose or by accident. Loglinear analyses of children's responses to this forced-choice explanation question revealed significant main effects of character age, with older characters seen as more likely to have acted on purpose, $G^2(1) = 10.59, p < .01$; of species, with people seen as more likely to have acted on purpose, $G^2(1) = 12.47, p < .001$; and of gender, with male characters seen as more likely to have acted on purpose, $G^2(1) = 5.04, p < .05$. Participants viewed girls as only marginally more likely than dogs to have acted on purpose, $G^2(1) = 3.50, p < .07$.

Relations Among Measures—Summing across all 12 scenarios, analyses of the relations among measures in Study 3 indicated that children who tended to give negative responses to one measure also tended to give negative responses to other measures. For example, severity estimates were correlated with mental state inference scores, $r(38) = .74, p < .0001$, with stability inference scores, $r(38) = .34, p < .02$, and with explanation scores, $r(38) = .62, p < .0001$, such that the more severe children believed the characters' behavior to be, the more likely they were to report that the characters liked to make people mad, that the characters' behavior would be stable over time, and that the characters acted on purpose. Taken together, these results provide evidence for the coherence of preschool children's sociomoral judgments.

What significance might perceptions of intent hold for children's judgments of behavior? One additional question of interest is whether intent judgments might mediate the relation between category membership and children's perceptions of the severity of behavior. To investigate this possibility, a 2 (age: older, younger) $\times$ 2 (species: person collapsed over gender, dog) within-subjects analysis of covariance was conducted on children's severity estimates, with performance on the explanation measure as a covariate. Results revealed that perceptions of intent, as assessed on the explanation measure, mediated the main effect of species information on severity judgments. That is, when controlling for the role of children's responses on the explanation measure, the previously significant relation between species and severity estimates

was no longer significant, $F(1, 78) = .40, p > .20$. This finding is consistent with previous work suggesting that perceptions of intent are associated with punitive judgments of those who commit transgressions (Dodge, Murphy, & Buchsbaum, 1984; Ferguson & Rule, 1988; Juvonen, 1992).

Summary—Study 3 replicated the main findings of Study 2. Participants made harsher inferences about children than about dogs, about boys than about girls, and about older characters than about younger characters. The effect of age information appeared uniform across levels of species and gender. In addition, participants showed some evidence of differentiating between dogs and girls in their inferences, suggesting that a bias against boys (see Heyman, 2001) is not the only explanation for the obtained differences in reasoning about people versus dogs. Consistent with the results of Studies 1 and 2, Study 3 suggests that young children do not universally apply one undifferentiated notion of psychological causation when solving social problems; rather, they behave as though different sorts of entities have predictably different minds.

GENERAL DISCUSSION

These results suggest that preschool-age children are influenced by social category information when evaluating and explaining ambiguous behavior (see Heyman & Gelman, 2000, for similar findings regarding preschoolers' use of trait information). Specifically, children show differentiated patterns of inferences as a function of a character's species, gender, and age.

First, preschool children attend to information about an actor's species when making inferences about that actor's behavior: across three studies, children rated the behavior of children as more severe and were more likely to use evaluative trait words when explaining a child's actions than when explaining a dog's actions. Participants were also more likely to use the behavior of children to draw general conclusions regarding dispositional tendencies, such as whether a character would engage in subsequent transgressions or enjoy making people mad. In addition, children in this study appeared to view people as more likely than dogs to deliberately commit transgressions, even though they were no more likely to use general intent language when explaining the actions of people than when explaining the actions of dogs.

These findings suggest that young children hold people up to different standards than they have for dogs and that young children are not simply applying notions of human agency onto the behavior of animals, as was suggested by Carey (1985). The finding that preschoolers were more likely to attribute deliberate intent to commit transgressions to human actors suggests that they may have some understanding that human minds are especially likely to deliberately cause sociomoral events. These findings also support the general premise that children's theory of human minds is at least to some degree differentiated from their attributions regarding the actions of other nonhuman actors in their social worlds.

Nonetheless, young children are clearly capable of reasoning about pets in psychological ways. For example, in Study 1, a 4-year-old who was asked to explain why the puppy spilled milk responded, "Well, he wanted some milk, but he should know he has his own milk at home." In light of recent evidence demonstrating that young children can also interpret the behavior of pets using a biological framework (Inagaki & Hatano, 2002), these findings lend support to the notion that even among young children, the same entity can be understood using multiple causal frameworks (Hickling & Wellman, 2001; Schult & Wellman, 1997).

This study extends to cross-species comparisons the results of previous research suggesting that inferring that another's transgression is intentional may provoke children to react more punitively (Dodge et al., 1984; Ferguson & Rule, 1988; Juvonen, 1992). For example, research

by Ferguson and Rule suggests that 5- to 10-year-old children are more likely to approve of retaliation against an actor whose initial transgression was intentional. Taken together, these findings support the general conclusion that children make harsher judgments when they are responding to behavior that they believe was enacted on purpose and with hostile intent. One possible reason for this may be that perceptions of hostile intent provoke feelings of anger, and this affective state then predisposes children to make harsh judgments (Graham & Hoehn, 1995; Juvonen, 1991).

A second set of findings suggests that children tended to evaluate the behavior of boys more negatively than the behavior of girls. Participants evaluated the behavior of boys as more severe, provided more negative explanations for the behavior of boys, attributed more intent to the behavior of boys, and were more likely to draw general conclusions based on the behavior of boys. These results extend findings obtained from older children (Heyman, 2001; Zalk & Katz, 1978) by demonstrating that even young children use gender information when interpreting the meaning of ambiguous behavior and highlight the possibility that, all else being equal, children view boys in a more negative light. However, children in this study did not simply treat boys as a privileged category and then lump members of other categories together; for example, on the mental state inference measures, participants viewed boys more harshly but maintained some degree of differentiation between female characters and dogs. This view suggests that the distinctions between humans and nonhuman animals obtained in this study are not merely driven by a tendency to view boys as bad (see Heyman, 2001).

A third set of findings in this study suggests that young children are sensitive to age information when making inferences about ambiguous behavior. Participants evaluated the behavior of older characters as more severe than that of younger characters. In addition, they were more likely to provide negative explanations for the behavior of older characters, more likely to use evaluative trait words when explaining the behavior of older characters, and more likely to attribute stability and intent to the behavior of older characters. These findings are consistent with the work of French (1984), who suggested that first graders understand that older children should be held up to stricter standards of behavior than younger children. One important question for debate is why age might guide young children's psychological inferences. In light of current discussions regarding children's understanding of the relationships between psychology and biology (e.g., Inagaki & Hatano, 1993; Notaro, Gelman, & Zimmerman, 2001), it will be interesting to examine the development of an understanding that people become more morally responsible for their behavior as they age. However, other explanations are also plausible. Perhaps children base their judgments on the consequences they think adults dole out to older versus younger children or on their perceptions of age-related differences in inhibitory control.

This study contributes to a growing body of evidence suggesting that young children's generalized beliefs affect their psychological interpretations of specific situations (see Dweck, 1999; Harris, 1989; Heyman & Gelman, 1999, 2000; Lagattuta & Wellman, 2001). For example, the results of Study 3 suggest that even before children reach school age, they are capable of making systematic judgments about intention (but see Ruble & Dweck, 1995, for a discussion of important differences between the dispositional judgments of younger versus older children). Even though young children may place less emphasis on intention in some contexts than would older children and adults, often ignoring distinctions between whether behavior is intentional or accidental (Karniol, 1978; Piaget, 1965; see also Malle, Moses, & Baldwin, 2001), this work provides evidence that young children can display sophisticated beliefs about whether behavior is purposeful and that these beliefs are systematically related to other evaluative judgments children make.

Children's tendency to interpret the behavior of certain characters as especially enduring and fundamental can be understood from within the perspective of psychological essentialism. Psychological essentialism is the tendency to conceive of entities as having deep and underlying natures that make them what they are and that constrain potentially observable characteristics (Medin, 1989; see also Gelman, Coley, & Gottfried, 1994, and Gelman, 2003, concerning essentialist reasoning in young children). An essentialist stance on social behavior would suggest that people have some basic core that dictates how they are likely to act in the present, as well as in the future. Although there is substantial evidence of individual differences in the tendency to engage in essentialist reasoning in the sociomoral domain (Giles & Heyman, 2003; Heyman, Dweck, & Cain, 1992; see also Dweck, 1999), this study's findings demonstrate that children's thinking about psychological properties can be quite flexible. That is, children do not appear to use a single, undifferentiated essentialist framework when making inferences about behavior, but instead employ psychological essentialism in their reasoning about the social world to varying degrees in different situations.

This differentiation suggests quite strongly that young children do not have a single updating model of psychology (see Perner, 1991). Rather, they appear to have several sets of organized beliefs about what the mind is like that vary as a function of the particular minds in question. For example, across a variety of measures, children in this study showed three patterns of dispositional inferences depending on whether the actor was a boy, a girl, or a dog.

How might these models emerge? One possibility is that children hold differentiated schemas about various categories because they observe differences in behavior and its consequences across categories. For example, if one observes a boy knocking over a tower made of blocks and laughing, one may infer that the boy derives some form of enjoyment from such a behavior. In contrast, if one observes a girl knocking over the same tower and then apologizing, one may infer that the girl's action was unintentional. Given repeated similar instances, children might develop generalized beliefs about the relationships between category membership and the mental states that underlie behavior. Such a possibility would be consistent with the notion of domain-specific knowledge arrived at through the use of relatively domain-general tools (see Gopnik & Wellman, 1994; but see Perner, 1991, and Wellman & Gelman, 1998, for a presentation of debates regarding the domain specificity of knowledge acquisition).

This study provides evidence that preschool-age children are harsher in their judgments of children compared to dogs, boys compared to girls, and older characters compared to younger characters. These results suggest that such social categories can serve as tools with which young children seek to explain, evaluate, and determine the greater relevance of social behavior. Moreover, this work supports the general conclusion that the tendency for children to attribute hostile intent to ambiguous behavior is affected by their perceptions of the characteristics of those who transgress on them.

Acknowledgments

This research was supported by NICHD Grant HD38529.

We thank Brian Compton for assistance with computer programming and Caroline Gee for assistance with data coding. We especially thank the administrators, teachers, parents, and children at Urban Village and Karen D. Love Head Start and Neighborhood House Association's Head Start Program.

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TABLE 1

Proportion of Children in Study 1 Giving Each Type of Response for All Measures, as a Function of Category Information Given

	Puppy ^a	Girl ^b	Boy ^c
Valence			
Negative	.080	.280	.280
Positive/neutral	.920	.720	.720
Reference to intent			
General intent language	.144	.156	.222
Reference to deliberate intent	.000	.044	.133
Reference to tangential intent	.144	.111	.089
No intent language	.856	.844	.778
Evaluative trait words			
Yes	.030	.160	.080
No	.970	.840	.920
Severity			
Very bad	.290	.520	.700
A little bad	.330	.300	.220
Not bad at all	.380	.180	.080
Generalizability			
Yes	.490	.620	.800
No	.510	.380	.200

^a*N* = 90.

^b*N* = 45.

^c*N* = 45.

TABLE 2
Proportion of Children in Study 2 Giving Each Type of Response for All Measures, as a Function of Category Information Given

	Younger Characters			Older Characters		
	Puppy	Girl	Boy	Dog	Girl	Boy
Valence						
Negative	.024	.220	.341	.098	.415	.585
Positive/neutral	.976	.780	.659	.902	.585	.415
Reference to intent						
General intent language	.098	.146	.049	.049	.049	.073
Reference to deliberate intent	.000	.024	.024	.000	.000	.049
Reference to tangential intent	.098	.122	.024	.049	.049	.024
No intent language	.902	.854	.951	.951	.951	.927
Evaluative trait words						
Yes	.000	.024	.146	.049	.049	.341
No	1.000	.976	.854	.951	.951	.659
Severity						
Very bad	.098	.171	.317	.146	.195	.732
A little bad	.341	.488	.659	.610	.707	.244
Not bad at all	.561	.341	.024	.244	.098	.024
Mental state inference						
Yes	.122	.293	.683	.171	.415	.829
No	.878	.707	.317	.829	.585	.171
Stability inference						
Yes	.390	.439	.659	.537	.659	.854
No	.610	.561	.341	.463	.341	.146

TABLE 3
Proportion of Children in Study 3 Giving Each Type of Response for All Measures (Averaged Over Story Type), as a Function of Category Information Given

	Younger Characters			Older Characters		
	Puppy	Girl	Boy	Dog	Girl	Boy
Severity						
Very bad	.175	.188	.313	.275	.263	.525
A little bad	.475	.475	.575	.600	.588	.400
Not bad at all	.350	.338	.113	.125	.150	.075
Mental state inference						
Yes	.225	.325	.525	.338	.488	.638
No	.775	.675	.475	.663	.513	.363
Stability inference						
Yes	.638	.388	.675	.788	.488	.700
No	.363	.613	.325	.213	.513	.300
Explanation						
Tried to	.325	.463	.663	.425	.325	.375
By accident	.675	.538	.338	.575	.675	.625