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Young Humeans: the role of emotions in children's evaluation of moral reasoning abilities

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Abstract

Three experiments investigated whether children in grades K, 2, and 4 (n = 144) view emotional comprehension as important in solving moral dilemmas. The experiments asked whether a human or an artificially intelligent machine would be best at solving different types of problems, ranging from moral and emotional to nonmoral and pragmatic. In Experiment 1, children in all age groups indicated that a human would be superior to a computer not only at comprehending emotions, but also at solving moral dilemmas. In Experiment 2, older children also indicated that a human could solve moral dilemmas better than a 'robot' with human-like perceptual and physical abilities. Experiment 3 further demonstrated that these effects were not solely due to a bias towards humans. Thus, children as young as age 5 view emotional understanding as an important element for moral, but not for nonmoral, reasoning, suggesting that the basis for Humean intuitions emerges early in life.

Introduction

Philosophers and psychologists have long debated the role that emotions play in moral reasoning. One way of approaching this issue is to look at the traditional debate between Kant and Hume. Kant (1785/1997) argued that morality is purely a product of reason and that emotions are irrelevant at best and potentially even detrimental to one's capacity for moral judgment. Conversely, Hume (1739/1978) proposed that all reason, including moral reasoning, is a product of 'the passions'. Furthermore, Hume argued that differences in moral judgment arise from individual differences in emotional responses, a position that has recently been seen as supported by empirical investigations (Damasio, 1994; Greene, Sommerville, Nystrom, Darley & Cohen, 2001; Wheatley & Haidt, 2005). Although some modern philosophers propose that the contrast between Kant's and Hume's positions is not so clear-cut (e.g. Prinz, 2006), we have adopted this distinction as a useful means of guiding our initial investigations into these issues.

Regardless of whether emotions actually influence moral judgments, there exists a separate question of whether we *believe* that emotional understanding is important for moral understanding and whether this belief guides our selection of moral advisors. One might assume that emotions are so intrinsic to being human that it is impossible to ask if one can make passion-free moral judgments, but there exist potential exceptions that allow an insight into our construal of moral expertise. For instance, among psychopaths, the ability to reason about potential outcomes is intact and perhaps even enhanced, yet moral judgments seem to be

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exceptionally flawed (Hare, 1993). It seems unlikely that one would consult a psychopath with questions of a moral nature, suggesting that the presence of emotional understanding may provide a cue for the selection of moral advisors.

Theories of artificial intelligence provide a different type of insight into the role emotions play when assessing potential sources of information. In the early 1980s, Turkle (1984) found that older children and adults were most likely to indicate that the presence of emotions is what sets humans apart from computers. More recently, Picard (1997) has argued that superior reasoning or intelligence is not sufficient, but rather, computers must have the capacity for emotional experience in order to fully distinguish right from wrong. This claim suggests a way to probe intuitions about moral expertise. Supposing a hypothetical computer or machine had access to every known historical and scientific fact and unlimited computational abilities, would one trust such a machine's conclusions about moral dilemmas more than a feeling human with far less knowledge and computational power? On the other hand, would one trust the machine's conclusions about mathematical or scientific questions in comparison to the same human? One of the key factors determining intuitions about each situation may be one's assessment of the machine's emotional capacity. Emotional comprehension or experience seem likely to constitute heuristics used to judge expertise and the capacity to give accurate advice in the moral domain, but not in other areas.

Children can differentiate among emotions beginning early in life (see Denham & Kochanoff, 2002) and their understanding of emotion influences their social and moral intuitions as early as preschool (Dunn, Cutting & Demetriou, 2000). Emotions also appear to play an important role in children's evaluations of moral but not nonmoral events (see Arsenio & Lover, 1995; Arsenio, Gold & Adams, 2006). Given these findings, one would expect children to associate emotional understanding with moral decision-making. However, because evaluating another person's knowledge involves an added level of complexity, it remains unclear whether they apply this association when choosing among potential sources of moral advice. Hence, the current study seeks to explore how broadly this phenomenon extends by documenting whether children view emotional comprehension as a key component of moral reasoning.

The experiments described below involve distinguishing between two sources of advice, where the key difference between the potential advisors is their capacity to perceive or experience emotion. Had this study been prepared exclusively for adults, a character with brain damage similar to Damasio's (1994) cases would have been a logical choice. However, such a character posed ethical and practical concerns (e.g. children might believe that some emotional abilities were spared or reside in other body parts). Instead, drawing from the literature on artificial intelligence, we developed a character that could believably have the factual knowledge and reasoning ability of a human, but would not have the capacity to comprehend or experience emotion: a computer.

Inanimate objects are typically considered to have different reasons for action than humans, who act on the basis of unique abilities such as intentions (White, 1995). However, certain machines appear to straddle the boundary between animacy and inanimacy, particularly robots, who often display what may seem like intentional actions or move in ways that resemble a human (Scaife & Van Duuren, 1995). When asked to assess the mental attributes of humans, computers, and robots, the majority of 5-year-old children indicated that computers are unable to experience emotions such as happiness or sadness (Mikropoulos, Misailidi & Bonoti, 2003). Conversely, only a minority of the same children stated that robots also lack the capacity for emotion. Thus, depending on the nature of the robot, children may attribute intentionality to this special category of inanimate objects.

Because we expected most children to understand that only a human advisor can comprehend or experience emotions, the crux of this study lies in whether children also indicate that only a human advisor can solve moral dilemmas. If children respond that only humans can comprehend or experience emotions, and that only humans can reason about moral issues, they may be drawing a connection between the capacity for emotion and moral reasoning. We expected that most children would be able to distinguish between humans and machines in terms of their capacity to answer emotional or factual problems, but were not clear whether the linkage between morality and emotions would be early emerging or only gradually internalized from the broader culture.

Experiment 1

Method

Participants—Participants included 16 kindergarteners (eight male; *M* = 5 years 6 months), 16 second-graders (eight male; *M* = 7 years 4 months), and 16 fourth-graders (seven male; *M* = 9 years 2 months), each of whom was interviewed individually in one 15-minute session. Participants were predominantly European-American from middle- and upper-middle-class backgrounds.

Materials and procedure—The session began with the introduction of each of the two characters. The human character, accompanied by a line drawing of an adult male, was introduced with the following description:

> This is a person. This person is a grown up. His brain tells him what to do. A lot of different people work with this person. He knows when someone is asking him a question or telling him what to do, and he can tell when someone is feeling happy or sad. This person is really smart. He knows all about animals, cars, music, and lots of other things. He does not know all the facts in every book, but he is always learning new things.

Children were then told that the other character ‘is different from the first one’ and the computer character was described as follows:

> This is a machine with a computer inside it. The computer tells the machine what to do. A lot of different people work with this machine. The machine knows when there is someone asking it a question or to telling it what to do, but it cannot tell if someone is feeling happy or sad. The machine is really smart. It knows all about animals, cars, music, and lots of other things. It also knows all the facts in every book and it is always learning new things.

The computer character was accompanied by a line drawing depicting a monitor attached to a keyboard and a plug. After hearing the description of each character, participants were prompted to tell what character it was (e.g. a person or a machine) and to describe what it could do in their own words. If they did not mention the character's emotional capacity in their description, the experimenter prompted them to do so.

Stimuli consisted of 16 brief dilemmas divided into four categories: emotional, moral, morally laden facts, and pure facts. All dilemmas involved a person with a proper name. Because the emotional and moral stimuli inherently involved other people, all of the items were constructed to involve multiple people. Each dilemma concluded with the statement ‘which one knows better [how to solve the problem]?’ and, if necessary, the experimenter pointed to the drawing of each potential advisor and asked if the human would know better or the machine would know better.

Emotional dilemmas involved the interpretation or assessment of another person's emotional reaction (e.g. whether a new joke will be considered funny). Moral dilemmas were intentionally designed so that the solution to the dilemma was not obvious (e.g. whether to break a promise to a friend in order to stay home and help one's mother). The morally laden fact dilemmas were included to control for the use of moral language in the moral dilemmas. These dilemmas were designed to resemble the moral dilemmas in terms of the situation, but solving the problem actually involved knowing specific facts (e.g. what kind of medicine to give a friend for a bee sting). Finally, the pure fact dilemmas involved problems that could only be solved through specialized knowledge, but did not require any emotional understanding (e.g. knowing where the fastest bird lives).

Each dilemma was accompanied by a line drawing depicting only the main character and an object associated with the dilemma. The dilemmas were presented in an intermixed pseudo-random order where no more than two items from each category appeared consecutively. Two orders of presentation were created for the dilemmas and the order of presentation of the human and machine was counterbalanced across participants.

Results and discussion

Participants received one point for each response where they selected the human advisor, for a total score of 0 to 4 on each of the four categories of dilemmas. Pilot testing revealed that adults ($n = 15$) chose the human 100% of the time for emotional and moral dilemmas, 12% of the time for the morally laden facts, and 3% of the time for the pure fact dilemmas. Thus, adults perceived a strong relationship between emotional comprehension and moral expertise.

A 4 (dilemma) × 3 (age) repeated measures analysis of variance (ANOVA) was performed with dilemma as the within-subjects factor and age as the between-subjects factor. Using the Greenhouse-Geisser correction for inhomogeneity of variance, the ANOVA revealed a main effect of dilemma, $F(2.24, 100.95) = 164.86$, $p < .001$, $\eta^2 = .786$, indicating that children differentiated between the four categories of dilemmas overall (see Figure 1). Correlational analyses also revealed strong positive correlations between scores for the emotional dilemmas and the moral dilemmas, $r(48) = .60$, $p < .001$, and for the morally laden facts and pure facts, $r(48) = .46$, $p < .001$, in addition to a significant negative correlation between scores for the emotional dilemmas and pure fact dilemmas, $r(48) = -.39$, $p = .006$. Therefore, children who indicated that the human would be the best advisor for the emotional dilemmas were also likely to indicate that the human would be most suited for the moral dilemmas, while at the same time preferring the computer for both the morally laden facts and pure facts.

There was also a significant main effect of age, $F(2, 45) = 6.14$, $p = .004$, $\eta^2 = .214$, and a significant interaction between Dilemma and Age, $F(4.49, 100.95) = 16.18$, $p < .001$, $\eta^2 = .418$. Post-hoc Tukey HSD analyses revealed that the effect of age was driven by differences between the kindergarteners and the two older groups, $p = .026$ for second-graders; $p = .006$ for fourth-graders. All three groups performed differently from chance on each type of dilemma, except for the kindergarteners on the morally laden facts, $t(15) = .89$, $p = .386$, and pure facts, $t(15) = .22$, $p = .827$. This suggests that the kindergarteners did not distinguish between the human and computer sources of advice on both types of fact-based dilemmas, perhaps due to difficulty comprehending that the computer should be better than a human at retrieving factual information.

These results suggest that even the youngest children associate the capacity for emotional comprehension more strongly with moral knowledge than with factual knowledge. The difference in scores between the moral and morally laden fact items also demonstrates that children did not simply select the human advisor based on the moral language present in the dilemma, but rather based on the dilemma itself. However, the kindergarteners appeared to display a general preference for the human advisor, regardless of the type of dilemma in question. Spontaneous remarks by a few of the kindergarteners suggested that they may have focused on the fact that the computer was *physically* incapable of expressing emotion or performing actions based on its knowledge (e.g. it cannot tell if a joke is funny because it cannot laugh). Thus, rather than focusing on the characters' cognitive and emotional capacities, some of the kindergarteners may have been focusing on the computer's physical limitations as the central characteristic that determined its abilities.

Experiment 2

Experiment 2 examined whether the immobile, inanimate nature of the computer was the primary factor influencing younger children's intuitions. We also extended our focus to include the element of the advisors' emotional experience in addition to their emotional comprehension. A new character more similar to a human in terms of physical and perceptual abilities replaced the computer. This character was described as an artificial creation with all the physical and cognitive abilities of a human but without the capacity to experience or comprehend emotions. For the sake of clarity, we will refer to this character as the 'robot'. However, the word *robot* was never used in order to avoid associations with specific robot exemplars seen on television or in movies, some of which appear to express emotions. The robot character was not imbued with any superior cognitive or perceptual skills; rather, it was presented as identical to a human in all ways except for emotional capacity. In addition to these changes, Experiment 2 employed a rating scale to gauge the strength of the relationship between emotional capacity and knowledge.

Method

Participants—Sixteen kindergarteners (eight male; *M* = 5 years 8 months), 16 second-graders (eight male; *M* = 7 years 4 months), and 16 fourth-graders (seven male; *M* = 9 years 7 months) were interviewed individually in one session lasting approximately 15 minutes. Participants were predominantly European-American or Hispanic-American from middle- and upper-middle-class backgrounds.

Materials and procedure—Experiment 2 began with an introduction to the 'robot' character, accompanied by the line drawing of the human used in Experiment 1 with a small alteration to the figure's shirt. The robot was introduced as follows:

> Let's imagine that scientists built a new thing that looks and acts just like a grown-up human. It can walk and talk. It can see and smell and taste and hear just like a human. It can think and learn about new things just like a human, and it knows a lot of things just like a human does. *But* when the scientists built this thing, they left out one part. They did not put in the part that makes a human have feelings. So, it does not laugh or cry. It does *not* feel happy when it hears happy news, and it does not feel sad when it hears sad news. It never has any feelings at all and it cannot tell how other people are feeling. It is exactly like a person except that it does not have any feelings.

The child was then asked 'what can this thing do?' and 'what part is missing?' and given additional prompts if necessary to ensure that they understood the character's abilities. The experimenter then explained that the child should think about how this 'thing' would be the same or different compared to a real human if it had to solve the same problem. The real human was then presented as 'a normal person who is not missing any parts', accompanied by a line drawing identical to the one of the robot except for different details on the character's shirt.

Stimuli consisted of the same dilemmas utilized in Experiment 1, with one exception. The morally laden fact dilemmas were replaced with dilemmas involving sensory perception (e.g. knowing if a new food is sour). This replacement was intended to serve as a control measure where, based on the descriptions provided, the human and the robot would be expected to be equally competent. The dilemmas were also altered so that each dilemma ended with the statement ‘which one knows better [how to solve the dilemma] or do they know it the same?’ Additionally, if children indicated that the human or the robot would know better how to solve the problem, they were subsequently asked whether that character would know ‘a little better’ or ‘a lot better’ than the other character.

As in Experiment 1, each dilemma was accompanied by a line drawing and the dilemmas were presented in an intermixed pseudo-random order. Two orders of presentation were created and the placement of the human and the robot was counterbalanced across participants. Furthermore, the line drawing used to identify each character was chosen at random for each subject in order to avoid potential biases.

Results and discussion

Participants' responses were converted into a 5-point scale, with a score of 1 indicating that the robot character would be a lot better than the human and 2 indicating that the robot would be a little better. Conversely, a 5 indicated that the human would be a lot better and 4 that the human would be a little better. Responses that the robot and human would be the same received a 3.

Participants' numerical responses on each of the four items within a dilemma category were averaged to yield a score of 1 to 5 for each type of dilemma. A repeated measures 4 (dilemma category) × 3 (age) analysis of variance (ANOVA) was performed with the average dilemma score as the within-subjects variable and age as the between-subjects variable. The only main effect consisted of dilemma category, $F(3, 135) = 16.94$, $p < .001$, $\eta^2 = .274$ (see Figure 2). Moreover, although all of the children preferred the human to the robot character, there was a significant positive correlation between scores on the emotional and moral dilemmas, $r(48) = .43$, $p = .002$, and a negative correlation between scores on the emotional and pure fact dilemmas, $r(48) = -.29$, $p = .047$. Thus, children who strongly preferred the human for the emotional dilemmas also strongly preferred the human for the moral dilemmas, while showing a decreased preference for the human on the pure fact dilemmas. Additionally, a positive correlation between the perceptual dilemmas and pure fact dilemmas was found, $r(48) = .35$, $p = .014$.

The finding that children preferred the human to the robot character overall was somewhat surprising since the robot character had been specifically set up to be equal to a human in terms of perceptual ability and factual knowledge. Perhaps children had difficulty believing that a man-made object could actually be as competent as a human at perceiving the world or knowing facts. Alternatively, perhaps the absence of emotion overshadowed the robot's cognitive abilities, making it seem like a poor choice overall. Children may reason that, all other things being equal, it is best to pick the character who has more abilities rather than less. The robot's resemblance to a human and its lack of any superior abilities that could potentially compensate for its emotional deficits may have made the robot an unappealing choice of advisor. Despite the fact that children may have found it more difficult to draw a distinction when faced with a human and a human-like character, children still demonstrated an association between the ability to understand emotions and solve moral problems, suggesting that they view the ability to experience emotions oneself and to comprehend emotions in others as important components of moral reasoning.

Experiment 3

Despite efforts to control for the artificially intelligent character's lack of human physical and perceptual abilities in Experiment 2, it remained possible that children were still basing their choices on overall preferences for a human when dealing with emotional or moral issues without necessarily focusing on the human's emotional understanding. Children may also be prone to thinking that an artificially intelligent machine is inherently deficient compared to a human, or that its experiences could never be considered comparable to true human experiences. Based on these concerns and our interest in assessing the importance of emotional understanding in and of itself, Experiment 3 eliminated the human character altogether and presented children with two computer characters that varied on their emotional comprehension only.

Method

Participants—Participants included 16 kindergarteners (eight male; *M* = 6 years 4 months), 16 second-graders (eight male; *M* = 8 years 2 months), and 16 fourth-graders (eight male; *M* = 10 years 4 months), each of whom was interviewed individually in one 15-minute session. Participants were predominantly European-American from middle-class backgrounds.

Materials and procedure—Experiment 3 involved two computer characters: one that contained a great deal of information (very similar to the computer character in Experiment 1) and one that had the capacity to comprehend emotions. The ‘intelligent computer’ was described as follows:

> This is a computer. A lot of different people work with this computer. The computer knows when there is someone asking it a question or telling it what to do, but it cannot tell if someone is feeling happy or sad. This computer knows all about animals, cars, music, and lots of other things and it knows all the facts in every book.

The ‘emotional computer’ was described as follows:

> This is a computer. A lot of different people work with this computer. The computer knows when there is someone asking it a question or telling it what to do, and it *can* tell when someone is feeling happy or sad. This computer can tell how people are feeling, but it does not know all the facts in every book.

Following the description of each computer, children were asked to explain what made that computer special, and were prompted if necessary to ensure that they understood the distinction between the computers.

Stimuli consisted of the same dilemmas utilized in Experiment 1. The line drawings accompanying each computer were identical to the drawing in Experiment 1 with the addition of orange or green color on the computer's monitor to help children distinguish between the computers. The presentation of color drawings and the order in which the computers were introduced was balanced across participants.

Results and discussion

Participants received one point for each response where they selected the emotional computer, for a total score of 0 to 4 on each of the four categories of dilemmas. A repeated measures 4 (dilemma category) × 3 (age) ANOVA with dilemma as the within-subjects factor and age as the between-subjects factor revealed a main effect of dilemma category, $F(3, 135) = 171.57$, $p < .001$, $\eta^2 = .792$ (see Figure 3). There was also a significant positive correlation between scores for the emotional dilemmas and the moral dilemmas, $r(48) = .443$, $p = .043$, and between the morally laden facts and pure facts, $r(48) = .45$, $p = .001$, similar to the effects seen in the previous experiments.

There was no main effect of age, reflecting the fact that scores were fairly consistent among the three age groups. However, there was a significant Dilemma by Age interaction, $F(6, 135)$

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= 7.313, $p < .001$, $\eta^2 = .245$. All three groups performed differently from chance on each type of dilemma, except for the kindergarteners on the moral items, $t(15) = .355$, $p = .728$, and morally laden facts, $t(15) = -.141$, $p = .178$, and the second-graders on the moral items, $t(15) = 1.447$, $p = .168$. Kindergarteners and second-graders may have been somewhat conflicted about whom to select for the moral dilemmas, yet their overall strong preference for the emotionally perceptive computer for moral items relative to fact items suggests that the presence of emotional comprehension influenced their judgments.

Children were generally less likely to endorse the ‘emotional computer’ in Experiment 3 than the human advisor in Experiment 1. Perhaps children take into account the unique nature of human experience or perhaps they simply consider humans to be the prototypical moral agent and automatically downgrade any non-human advisor. Nevertheless, they still made an association between the capacity to comprehend emotions and the ability to solve emotional and moral dilemmas and they remained reluctant to select the character with a large store of factual knowledge as a moral advisor.

Discussion

Given a choice between two intelligent characters as sources of advice for different types of problems, children in all age groups favored the character with the capacity to comprehend or experience emotions as the better advisor for dilemmas that involve emotional or moral knowledge but not for nonmoral problems. Although this distinction may become somewhat more difficult as the character in question grows more similar to a human in terms of perceptual and physical skills, a strong reluctance to select an entirely non-emotional computer or robot as a potential moral advisor remained apparent among all age groups. Moreover, the morally laden fact questions in Experiments 1 and 3 suggest that this effect is not simply a result of an association with moral language. Experiment 3 also demonstrates that this effect is not based on a general preference for human advisors.

While the youngest children in our study would be expected to exhibit basic theory of mind skills (see Wellman, Cross & Watson, 2001, for a review), the understanding that other minds are subject to different influences and that they may interpret information differently does not fully emerge until middle childhood (Flavell, 1999). Thus, the older children may have had a stronger grasp of the differences among the potential advisors and the types of questions they could answer.

These experiments also suggest that, in general, children exhibit the foundations for a Humean perspective on morality. The origin of this perspective remains unclear, but one potential account is that even very young children have some awareness that their own actions are based on emotional responses to situations, regardless of what kind of situation they face. Indeed, with somewhat more limited cognitive capacities it may be all the more apparent to young children that they arrive at moral convictions without an overlay of rational thought. As their capacity to deliberate improves and children gain more insight into their own experiences of conflicting emotions and desires (see Choe, Keil & Bloom, 2005), they may grow even more aware of how emotions play a role in moral reasoning but not in other types of decisions. Furthermore, by age 9, children seem to be more capable of conceptualizing nonmoral decisions as a result of rational thought that is not improved by emotional understanding, though the specific degree to which they believe emotions influence one's ability to reason rationally remains a question for future research.

In our studies, some children explicitly mentioned the human character's capacity for empathy as the basis for their decision. For example, they justified their selection of the human for the moral dilemmas in Experiments 1 and 2 by stating that they chose him ‘because he has feelings’ or, more elaborately, ‘because [the person] would know if the [girl in the story] would get hurt feelings’. In light of evidence that emotion is one of the first aspects of the mind that children can discuss (Bartsch & Wellman, 1995), children may have an easier time explicitly conceiving of a moral decision as based on emotional responses than on rational thought.

Moral judgment may be viewed as a problem of immense computational complexity, where one's own emotions and the emotions of others provide a guide for which one of many possibilities one should seriously consider. Without an understanding of how other people feel and how our actions affect their emotional state, we would have to rely solely on rational calculations, as a computer or robot might do, and the number of potential variables and their interactions may swamp the limits of real time human cognition. Although Kant and others have argued that rational thinking is a more effective means for making moral choices, our intuitions, beginning as early as age 5, are to avoid consulting minds that rely solely on reason when dealing with matters of the heart.

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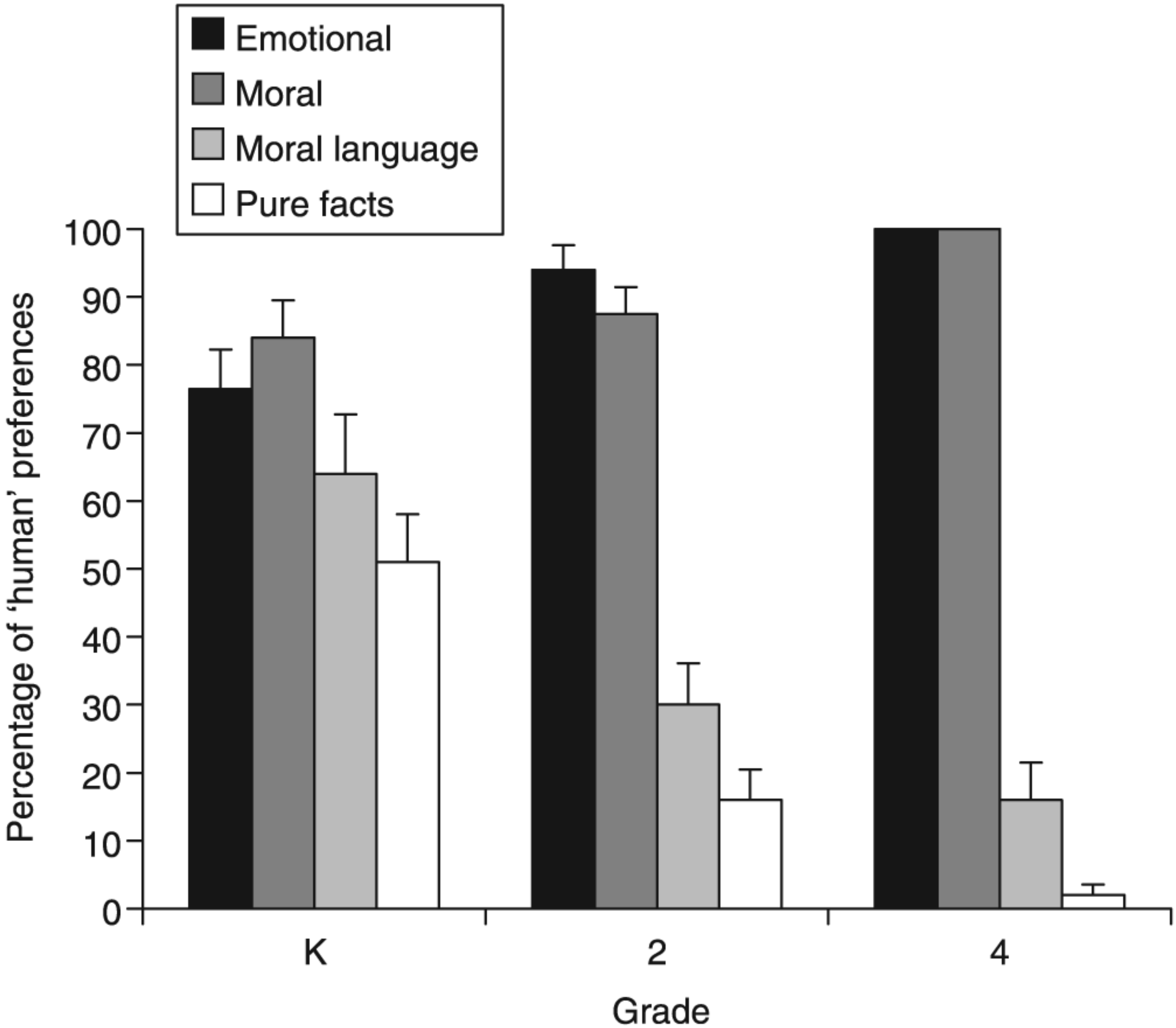

Figure 1.
Mean percentage of responses preferring the human character for each type of dilemma in Experiment 1.

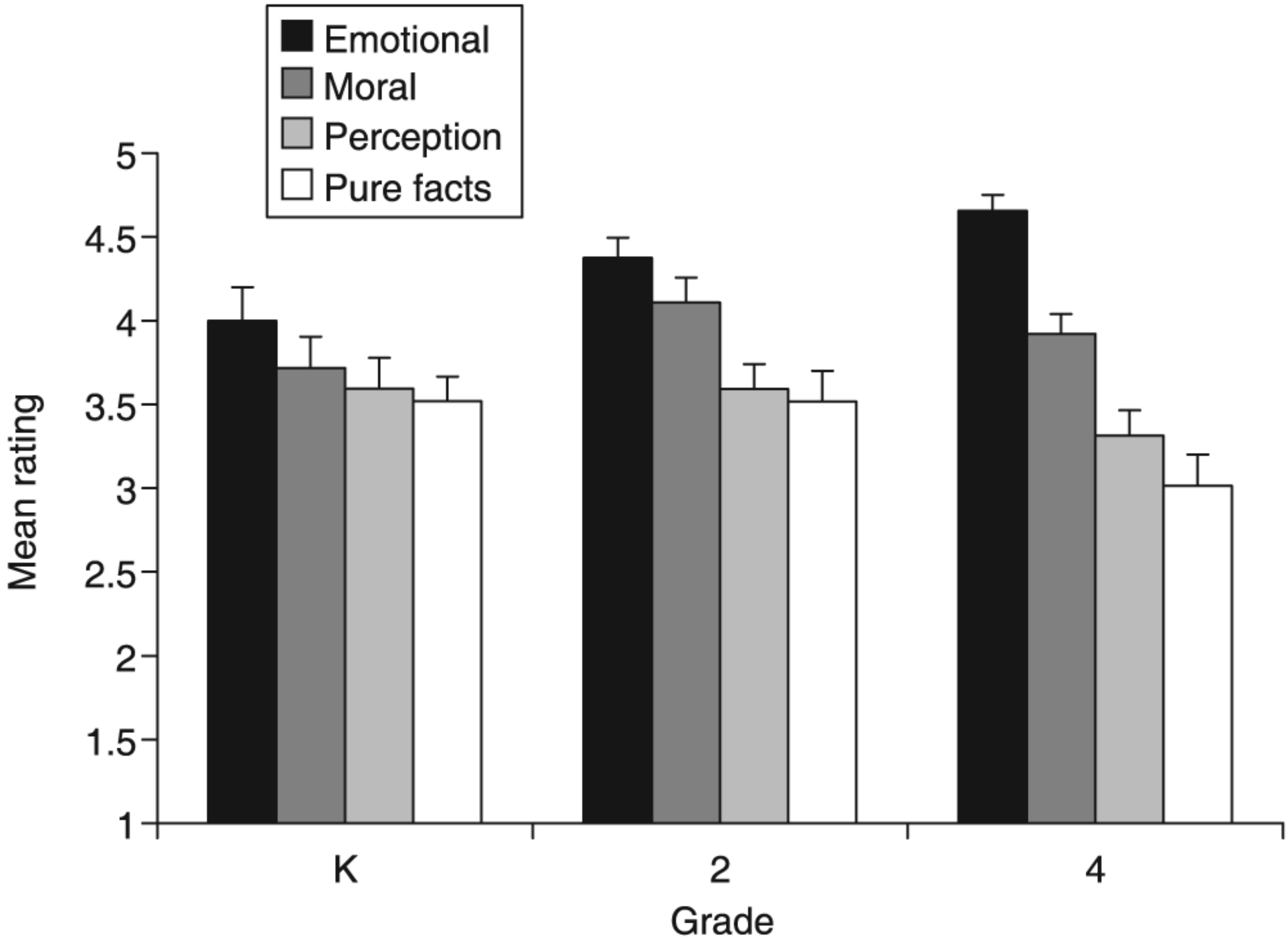

Figure 2.
Mean rating score for each type of dilemma in Experiment 2.

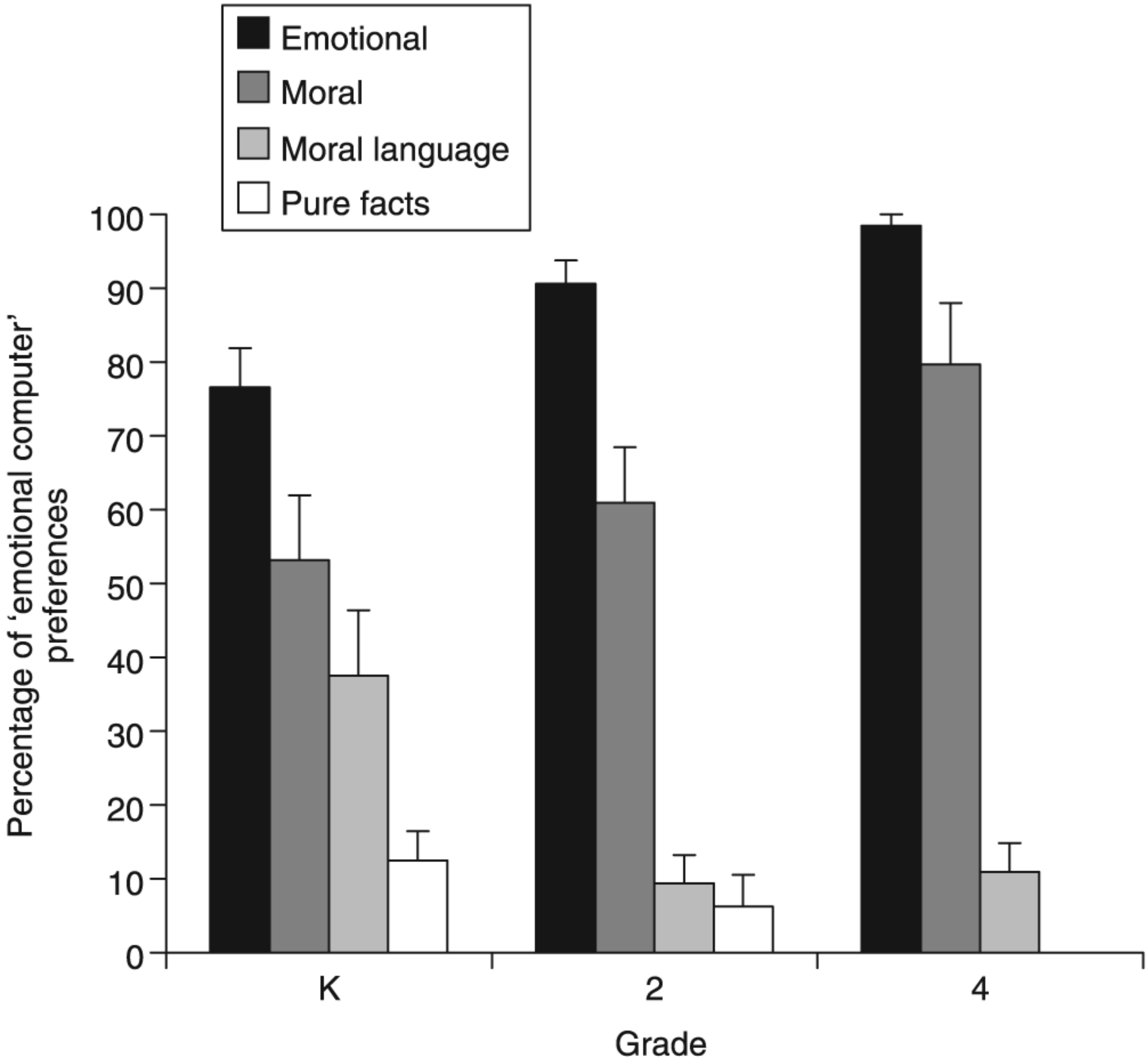

Figure 3.
Mean percentage of responses preferring the 'emotional computer' for each type of dilemma in Experiment 3. (Note: no fourth-grader chose the 'emotional computer' for any of the pure fact dilemmas.)