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SHORT REPORT

Teaching moral reasoning through gesture

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Abstract

Stem-cell research. Euthanasia. Personhood. Marriage equality. School shootings. Gun control. Death penalty. Ethical dilemmas regularly spark fierce debate about the underlying moral fabric of societies. How do we prepare today's children to be fully informed and thoughtful citizens, capable of moral and ethical decisions? Current approaches to moral education are controversial, requiring adults to serve as either direct ('top-down') or indirect ('bottom-up') conduits of information about morality. A common thread weaving throughout these two educational initiatives is the ability to take multiple perspectives – increases in perspective taking ability have been found to precede advances in moral reasoning. We propose gesture as a behavior uniquely situated to augment perspective taking ability. Requiring gesture during spatial tasks has been shown to catalyze the production of more sophisticated problem-solving strategies, allowing children to profit from instruction. Our data demonstrate that requiring gesture during moral reasoning tasks has similar effects, resulting in increased perspective taking ability subsequent to instruction.

A video abstract of this article can be viewed at http://www.youtube.com/watch?v=gAcRIClU_GY

Introduction

Historically, great debates have considered whether we can and should shape the morality of our populace through educational initiatives (Gutmann, 1987; Lickona, 1991; O'Neill, 1995). Despite disagreement about specifics, most agree that some dialogue about ethics and morality is crucial to preparing children to participate as informed citizens within a pluralistic democracy (Gutmann, 1987). To this end, educational initiatives have focused either on cultivating virtue of character (e.g. traditional character education via character ethics; MacIntyre, 1981; Noddings, 2002; Wynne, 1991) or on promoting an understanding of universal claims about justice and reasoning (e.g. rational moral education via rule ethics; Colby & Kohlberg, 1987; Frankena, 1973; Kant, 1949; Kohlberg, 1984; Power, Higgins & Kohlberg, 1989).

While these debates have theoretical merit, they can detract from the goal of advancing children's moral reasoning capabilities, which may be better served by seeking out commonalities across approaches, rather than focusing on philosophical differences. A common thread that weaves throughout these two educational initiatives (Colby & Kohlberg, 1987; Kohlberg, 1984; Power *et al.*, 1989; Wynne, 1991), as well as through each major theory of moral development (Colby & Kohlberg, 1987; Eisenberg, 1986; Eisenberg-Berg & Hand, 1979; Kohlberg, 1984; Piaget, 1932/1965; Power *et al.*, 1989; Smetana, 2006; Turiel, 1969, 1998), is the ability to take multiple perspectives (DeVries, 1970; Flavell, 1968; Selman, 1971a). Selman (1971a) defines perspective taking as 'the ability to infer another's capabilities, attributes, expectations, feelings and potential reactions' (p. 1722). Berkowitz (2002), an advocate of traditional character education, argues that 'moral functioning depends on the ability to balance different perspectives' (p. 52). Importantly, perspective taking has been shown to be a reliable precursor to mature moral reasoning skills and behaviors (Selman, 1971b, 1977). For example, Selman (1971b) found that children with good perspective taking skills improved their moral reasoning (as measured by Kohlberg's, 1987, Moral Judgment Interview, MJI) earlier than children without these skills. Similarly, in a training study, Walker (1980) found that children who were able to take another's perspective

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were more likely to benefit from a role-playing exercise in moral reasoning than children who did not have these perspective taking skills.

Here we argue that gestures – the hand movements spontaneously produced while talking – can facilitate perspective taking on moral reasoning tasks in school-aged children, and thus help them take the first step toward solving moral problems in a mature fashion.

Previous research has demonstrated that gesture is reliably produced during discussions, in both narrative (McNeill, 1992) and problem solving (Broaders, Cook, Mitchell & Goldin-Meadow, 2007; Church & Goldin-Meadow, 1986; Perry, Church & Goldin-Meadow, 1988) discourse. These gestures have the power not only to predict (Church & Goldin-Meadow, 1986; Perry *et al*., 1988) but also to facilitate (Broaders *et al*., 2007) learning in spatial domains. Discussions led by knowledgeable adults have been argued to facilitate moral development (Colby & Kohlberg, 1987; Eisenberg, 1986; Eisenberg-Berg & Hand, 1979; Frankena, 1973; Kant, 1949; Kohlberg, 1984; MacIntrye, 1981; Noddings, 2002; Piaget, 1932/1965; Power *et al*., 1989; Smetana, 2006; Turiel, 1969, 1998; Wynne, 1991) and gesture is a natural accompaniment to these discussions (Church, Schonert-Reichl, Goodman, Kelly & Ayman-Nolley, 1995), thus setting the stage for gesture to play a role in the development of moral reasoning, a non-spatial domain.

Methods

Participants

Forty-five fifth-grade students (15 boys) originally served as participants in this study; three children were excluded due to camera/videotape malfunctions, leaving 42 (15 boys) in the final sample. Students were recruited from seven classrooms within three Chicago-area elementary schools. Each child was tested individually at his or her school during the course of a typical school day (see Supporting Information [hereafter referred to as SI] available online for additional demographic details).

Each child participated in one experimental session. Interviews lasted an average of 29:07 minutes (SD = 7.37), ranging from 16:33 to 44:55 minutes. All experimental sessions were videotaped for later coding of speech and gesture.

Procedure

All children participated in a Pretest, Gesture Manipulation/Training, and Posttest. Children reasoned about three different dilemmas (one at each time point) taken from the Moral Judgment Interview (MJI; Colby & Kohlberg, 1987). Each dilemma juxtaposed contractual obligation against obedience to a higher authority and explored circumstances under which a promise may be considered sacrosanct. The dilemmas used in Pretest (see Data S1 in SI) and Posttest (see Data S3 in SI) emphasized obedience to personal authority (the family in both cases); the dilemma used in Gesture Manipulation/Training (see Data S2 in SI) emphasized obedience to a more formal authority (the law).

During each phase of testing (Pretest, Gesture Manipulation/Training, Posttest), children first read the dilemma silently while the experimenter read the dilemma aloud, and the children then gave a brief summary of the main points of the story. The children then judged how the dilemma could be resolved. For example, in the Two Brothers dilemma (see Data S2 in SI), two brothers need money and seek to obtain it through illicit means; one brother cheats an old man, the other steals from a store. Children were asked to decide which is worse, cheating or stealing. After making their judgment, children answered seven questions probing the reasoning underlying their judgment (see dilemmas and probe questions in SI).

Children were given the Pretest dilemma and seven Pretest probe questions at the beginning of the session. They were then randomly assigned to one of three conditions, which dictated how they were to use their hands when explaining the judgment they made on the dilemma presented during the Gesture Manipulation: (1) Told-to-gesture (TTG) – children were encouraged to move their hands as much as possible while answering the Gesture Manipulation probe questions (N = 12); (2) Told-not-to-gesture (TNTG) – children were discouraged from moving their hands (N = 13); (3) Control (C) – children were given no instructions about their hands (N = 14). After responding to the probe questions, all children received Training on the dilemma used in the Gesture Manipulation (see Data S4 in SI); the training, which was identical for all children, was carried out by two experimenters who enacted a role-play lesson in moral reasoning (Walker & Taylor, 1991). The primary experimenter began by asking children to reiterate the judgment they had made on the Gesture Manipulation dilemma (i.e. 'If you had to choose the worst thing to do, would you choose cheating or stealing?'). The second experimenter then disagreed with the child's judgment, and the first experimenter responded by supporting the child, invoking an explanation involving multiple perspectives to do so. While the child looked on, the two experimenters went back and forth for another turn, giving responses that illustrated multiple perspectives (Data S4 in SI). The experimenters did not gesture

during these back-and-forth exchanges. After Training, all children were given the Posttest dilemma and seven Posttest probe questions. Figure 1 illustrates the steps of the experimental procedure.

Speech and gesture coding

All speech and gesture utterances produced during the probe questions for the Pretest, Gesture Manipulation, and Posttest dilemmas were coded. Speech was transcribed verbatim from the audio record and relevant clauses were isolated using the coding system established by Colby and Kohlberg (1987). Each spoken clause was then coded for single vs. multiple perspectives (see Data S5 in SI). Co-speech gestures were described in terms of handshape and motion without access to accompanying audio. Given McNeill's (1992) finding that English speakers produce one gesture per clause, each gesture was assumed to reflect a clause and was given a code for perspective. Gestures were considered single perspective if they depicted the viewpoint of one individual, and multiple perspectives if they depicted the viewpoints of more than one individual (see Data S5 in SI). An independent coder established inter-rater reliability by recoding 20% of Pretest data for speech and gesture. Agreement between coders was 94% for speech, 92% for gesture.

Results

Data were analyzed using univariate ANOVAs with gesture condition as the between-groups factor unless otherwise indicated. We found no between-group differences at Pretest in the mean number of clauses produced in either speech, $F(2, 38) = 0.309$, $p = .736$, or gesture, $F(2, 38) = 2.124$, $p = .134$, as a function of gesture condition. However, individuals varied in total number of clauses produced in both modalities; as a result, proportions were used in the remaining analyses. All proportions were arcsin-transformed prior to statistical analysis.

We calculated the proportion of responses containing multiple perspectives (MPR) for speech and gesture. Importantly, there were no between-group differences as a function of condition in the proportion of MPR in speech at Pretest: TTG 0.05 ($SD = 0.06$), TNTG 0.06 ($SD = 0.07$), Control 0.10 ($SD = 0.11$), $F(2, 38) = 1.707$,

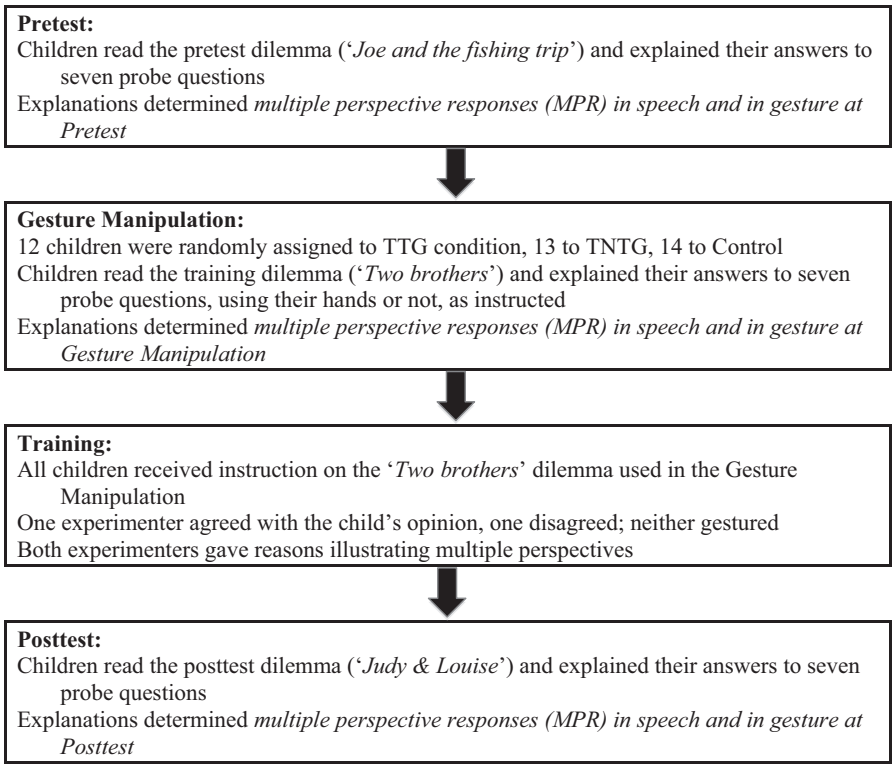

Figure 1 *Outline of steps in the experimental procedure.*

$p = .196$. Note that the production of MPR in speech was quite low, replicating previous research on perspective taking in moral reasoning (Flavell, 1968; Selman, 1971a, 1971b) and leaving room for instruction to improve performance. There were also no reliable between-group differences at Pretest in the proportion of MPR in gesture, TTG 0.14 ($SD = 0.29$), TNTG 0.12 ($SD = 0.13$), Control 0.24 ($SD = 0.15$), $F(2, 38) = 0.677$, $p = .514$.

Children complied with the Gesture Manipulation instructions: None of the 13 children in TNTG produced gestures when responding to the probe questions on the Gesture Manipulation dilemma, whereas all 12 of the children in TTG did, as did 11 of the 14 children in the Control condition who were given no instructions about their hands.

During Gesture Manipulation we told children to gesture but did not tell them what to gesture. Surprisingly, we found that TTG children, who were told to gesture, produced a greater proportion of MPR in the gestures they produced during Gesture Manipulation than Control children, who were given no instruction regarding their hands: TTG 0.26 ($SD = 0.17$) vs. C 0.08 ($SD = 0.16$), $F(1, 25) = 7.174$, $p = .013$, controlling for MPR in gesture at Pretest. Merely telling children to gesture increased the proportion of MPR they produced in those gestures. Moreover, gesturing – either spontaneously or in response to instruction – during Gesture Manipulation was associated with more MPR in speech during this period: TTG 0.21 ($SD = 0.12$), Control 0.13 ($SD = 0.17$), TNTG 0.01 ($SD = 0.05$), $F(2, 38) = 8.779$, $p = .001$, controlling for MPR in speech at Pretest. Post-hoc comparisons revealed that TTG and Control children both produced significantly more MPR in speech during Gesture Manipulation than TNTG children ($p < .0001$ and $p = .007$, respectively); there were no significant differences between TTG and Control children ($p = .226$).

Our central question was whether directing children's attention to multiple perspectives via gesture prior to instruction in moral reasoning would affect their ability to profit from that instruction. To address this question, we examined children's MPR responses in speech at Posttest, and found a significant difference between groups, $F(2, 38) = 18.022$, $p < .0001$, controlling for MPR in speech at Pretest (Figure 2). Post-hoc comparisons revealed that TTG children produced significantly more MPR in speech at Posttest than either Control ($p = .044$) or TNTG ($p < .0001$) children. Moreover, Control children produced significantly more MPR in speech than TNTG children ($p = .001$).

During the Posttest, children in the TTG and TNTG groups were told to use their hands in whatever way made them feel comfortable, and children in the Control condition were again given no instructions about their hands. Interestingly, the groups did not differ in the number of gestures they produced at Posttest: TTG 4.17 ($SD = 3.90$), TNTG 2.85 ($SD = 2.94$), Control 6.21 ($SD = 4.82$), $F(2, 38) = 1.407$, $p = .259$, controlling for number of gestures produced at Pretest and Manipulation. Nor did the groups differ in the proportion of MPR responses they produced in gesture at Posttest: TTG 0.08 (SD = 0.08), TNTG 0.01 (SD = 0.03), Control 0.08 (SD = 0.08), $F(2,38) = 2.572$, $p = 0.091$, controlling for MPR in gesture at Pretest and Manipulation. The fact that our Gesture Manipulation did not have a lasting effect on the number or type of gestures the child produced is important. It makes it clear that the increase in MPR in speech on the Posttest in the groups who gestured during the Manipulation was not merely a reflection of those gestures carried over to the Posttest. The gestures were, in fact, not carried over, suggesting that the Posttest increases in MPR in speech were a result of the gesturing the children did prior to training during the Gesture Manipulation.[1] Thus, despite the fact that

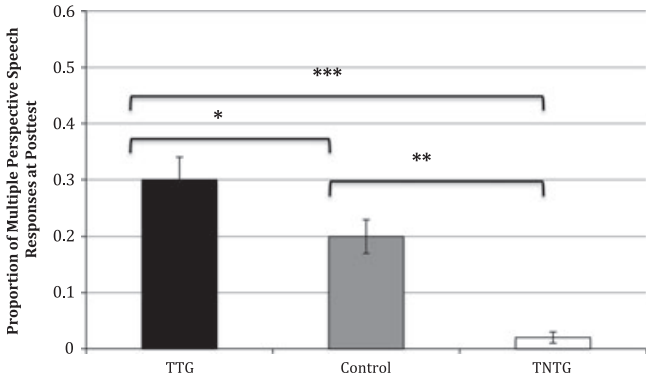

Figure 2 *Proportion of Multiple Perspective Responses (MPR) produced in speech on the Posttest by children who were told to gesture during the Manipulation (TTG), children who were told not to gesture (TNTG), and children who were given no instructions about their hands (Control). *p < .05; **p ≤ .001; ***p < .0001.*

[1] The proportion of MPR that the children produced in gesture on the Posttest did correlate with the proportion of MPR they produced in speech on the Posttest, $r = 0.316$, $p = .05$. However, all three groups produced fewer MPR responses in gesture on the Posttest than on the Pretest (a decrease from .14 to .08 for TTG, from .24 to .08 for Control, and from .12 to .01 for TNTG). In contrast, the two groups allowed to gesture during the Manipulation displayed increases in MPR in speech from Pretest to Posttest (from .05 to .29 for TTG, from .10 to .20 for Control), but the group prevented from gesturing displayed a decrease in MPR in speech from Pretest to Posttest (from .06 to .02 for TNTG). It is therefore difficult to argue that the children's spoken MPR responses on the Posttest were entrained by their gestured MPR responses on the Posttest.

our Gesture Manipulation did not have a lasting effect on gesturing, it did have a measurable effect on children's ability to profit from instruction.

To explore the phenomenon at an individual level, using a bivariate correlation we examined the proportion of MPR in speech added at Posttest (i.e. MPR at Posttest minus MPR at Pretest) in relation to the proportion of MPR produced in gesture during Gesture Manipulation, and found a significant positive correlation between the two, $r = 0.425$, $p = .03$ (see Figure 3). This relation holds even when we control for MPR in gesture at Pretest, $r = 0.418$, $p = .01$. These correlations include only children in the TTG and Control groups (i.e. only the children who had the option of gesturing during the Gesture Manipulation). If all of the children are included in the analysis, even those who were told not to gesture (i.e. the TNTG group), the correlation between MPR in gesture during Manipulation and MPR added in speech from Pretest to Posttest is $r = 0.542$, $p < .0001$ and $r = 0.537$, $p = .001$, controlling for MPR in gesture at Pretest. Thus, the more multiple-perspective *gestures* children produced prior to training, the more multiple-perspective *spoken* responses they produced after training.

Importantly, the relation between MPR in gesture at Manipulation and the increase in MPR added in speech at Posttest also holds if we control for the proportion of MPR in gesture at Posttest, $r = 0.403$, $p < .05$ ($r = 0.511$, $p = .001$, if we include all of the children in the analysis, even those told not to gesture during Gesture Manipulation). This result suggests once again that it is the gesturing children did during the Manipulation that contributed to the improvement they displayed in speech at Posttest, rather than the gesturing they did during the Posttest itself.

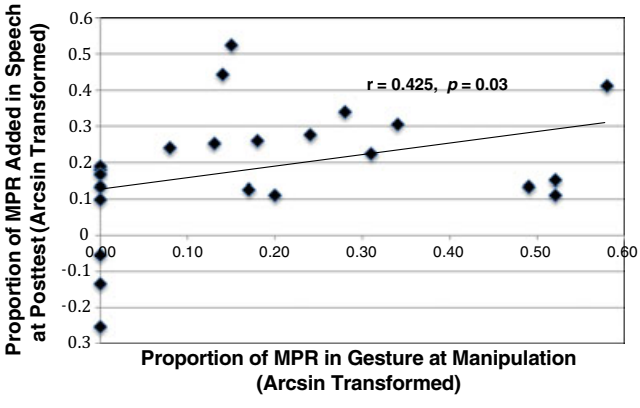

Figure 3 *Proportion of Multiple Perspective Responses (MPR) added in speech at Posttest as a function of the proportion of MPR in gesture at Manipulation. The graph includes children in the TTG and Control groups, who had the possibility of gesturing during the Manipulation.*

Discussion

We have found that requiring children to gesture affects their ability to profit from a lesson in moral reasoning. Children who were told to gesture produced significantly more responses involving multiple perspectives in speech after a lesson in moral reasoning than children who were told not to gesture, and than children who received no instructions in how to use their hands. Our findings suggest that when children gesture prior to a lesson – either spontaneously or because they are specifically instructed to do so – they are more likely than children who do not gesture to capitalize on a lesson in moral reasoning and, as a result, take perspectives that go beyond their own.

Why does gesturing have an impact on how much children learn from a lesson in moral reasoning, a domain that is not inherently spatial? We suggest that gesturing allows learners to take ideas that are not spatial and lay them out in space, thus 'spatializing' them. Gesturing may thus allow learners to make use of spatial learning mechanisms (Newcombe, 2010) that they would not have used had they not gestured. Children may be literally taking one perspective on one hand, and another perspective 'on the other hand'.

Our findings hint at a viable method for improving perspective taking, which is a reliable precursor to mature moral reasoning. It is relatively easy to increase the rate at which children gesture (Cook, Mitchell & Goldin-Meadow, 2008; Goldin-Meadow, Cook & Mitchell, 2009) and doing so has been shown to improve children's ability to profit from instruction in mathematics (Perry *et al.*, 1988). We found here that encouraging children to gesture on a moral reasoning task can have an impact not only on how much they gesture, but also on what they gesture – telling children to gesture increases the proportion of multiple perspective responses they produce in those gestures. This focus on multiple perspectives, instantiated in the hands, may then increase children's ability to profit from a lesson in moral reasoning, providing a non-controversial and easily implemented method to get children to take the first step toward improving how they reason about moral dilemmas. This step is necessary for the development of moral reasoning, but on its own is not sufficient (Selman, 1977; Walker, 1980). Whether this first step can have a ripple effect, leading to mature moral reasoning across topics, over time, and in more heterogeneous populations, is a question for future research.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Data S1. Pretest Dilemma.

Data S2. Gesture Manipulation Dilemma.

Data S3. Posttest Dilemma.

Data S4. Training.

Data S5. Methodological Details (Demographic Information for Participants & Coding of Speech & Gesture).

Movie S1. Take' gesture (1-hand) S1 illustrates a gesture depicting exchange in the form of taking. The focus is on the participant's right hand, at rest on the back of the bench on which the participant is sitting. The participant lifts his hand from the bench and reaches out away from the body along a straight trajectory. The hand opens up, such that the palm is facing away from the body with the fingers spread. The hand grasps an imaginary object and retracts toward the body, along the original trajectory.

Movie S2. 'Hold' gesture (2-hands). S2 illustrates a gesture depicting **'**possession. Both hands are open with the palms of each hand facing up. Fingers curl back toward the heels of the palms, as if grasping an imaginary object[s].

Movie S3. 'Hierarchy' gesture (1-hand). S3 illustrates a gesture depicting hierarchy through movement in space. Both hands begin at the participant's chest level. The participant's hands are situated so that palms are facing down toward the floor and fingers are facing away from the body to the front. The motion of the gesture consists of the right hand moving on top of the left and then moving upward rapidly along a vertical plane.

Movie S4. 'Dual Perspectives' gesture (2-hands). S4 illustrates a gesture depicting dual perspectives through the distinct demarcations of space. Both hands begin in the participant's lap. The participant's hands rotate so that the palms are facing upward the fingers are facing out away from the body. The motion of the gesture consists of the right hand moving out to the right side of the body, while the left moves out to the left. The hands come together in the front of the body and the sides of the palms touch. The hands then return to their respective sides of the body with the right hand initiating the return to the right prior to the left hand initiating the return to the left.