

DEVELOPMENT OF UNDERSTANDING OF INTENTIONALITY AND MORAL JUDGMENTS IN PRESCHOOLERS

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To explore the development of preschoolers' understanding of intentionality and moral judgments, we administered 3 tasks (classic intentionality, skill intentionality, and awareness intentionality) to 344 children aged between 3 and 6 years. The results showed that children's understanding of intentionality and moral judgments developed with increasing age. That is, the intentionality and moral judgments made by 3- to 5-year-olds were generally based on behavioral outcomes. In contrast, 6-year-old children started to make judgments by combining behavioral outcomes with intentionality conditions, which meant that they had started to consider different factors so as to analyze and judge the intentionality and morality of behaviors objectively. The developmental trajectory of intentionality and morality revealed by our study provides theoretical support for guiding children's intentionality and moral judgments.

Keywords: preschoolers, intentionality, moral judgments, skill, awareness, behavioral outcomes.

Theory of mind (Premack & Woodruff, 1978) refers to children's ability to understand others' psychological states, including intentionality, false beliefs, wishes, and emotions (Wellman, 2002). In addition, Killen and Rizzo (2014) reported that *intentionality*, referring to children's concepts of intention, and their usage of intention cues in evaluating actions (Imamoğlu, 1976) is closely connected not only with desires and beliefs but also with *moral judgments*, which

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are children's responses to morally relevant issues in social interactions (Killen & Rizzo, 2014), because the recognition of intentionality is essential in making such judgments. Therefore, in the present study, we explored the developmental characteristics of understanding intentionality and moral judgments.

Piaget (1932) initially studied the function of understanding of intentionality in children's moral judgments using the dilemma story method. He presented pairs of stories featuring two agents, who showed either intentional or unintentional behaviors that led to outcomes of the same nature but to different degrees. For example, one boy broke three vases when he was helping his mother do the housework, whereas the other boy broke one vase on purpose. The children then judged which boy's behavior was worse and deserving of punishment. Piaget found that children under the age of 5 years could not compare the contexts of the two stories, whereas children aged between 6 or 8 years made moral judgments according to the outcomes and the severity of the damage instead of the intentionality of the behaviors. Further, children above the age of 10 years began to focus on the behavioral agents' motives and intentionality.

Some researchers thought that the tasks Piaget (1932) used were too complex, which meant that the children's abilities were underestimated; thus, the task difficulty level was reduced in later studies. For example, Phillips, Baron-Cohen, and Rutter (1998) used a single story in place of story pairs, a rating system in place of forced choices, and presented pictures or videos while telling the stories. They found that children aged 3 years could tell intentional behaviors from unintentional behaviors and believed that the former should result in more punishments. Further, Malle, Guglielmo, and Monroe (2014) found that children aged about 4 years could make moral judgments according to intentionality. Thus, we decided to focus in this study on understanding intentionality and moral judgments in children aged 3 to 6 years.

On the basis of classic intentionality research, Malle (2006) asserted that skill and awareness are two necessary elements of intentional behaviors, and further stated that the understanding of these variables may affect moral judgments. *Awareness* refers to whether individuals realize what they are doing when making *judgments* (Malle, 2006); namely, the achievement of goals and the expectation of outcomes (Laurent, Clark, & Schweitzer, 2015). The skill element refers to whether or not individuals are capable of accomplishing what they want to and achieving expected outcomes (Laurent et al., 2015; Malle, 2006). For example, Malle and Knobe (1997) showed in their pilot study that when a novice dart player hit a rather difficult triple 20 throw on their first try but missed on the second try, only 16% of participants thought that the player obtained the initial good score on purpose. However, if the situation description contained more factors related to skill, for example, if the player hit a triple 20 on two consecutive throws, 55% of participants thought that the initial good score was obtained intentionally.

When children make moral judgments, they do not at first base these on intentionality. According to Piaget's (1932) results and Kohlberg's (1973) theory of moral development, children's moral development advances from a results-oriented style to a motivation orientation, which indicates that the result of a behavior greatly affects children's moral judgments in early childhood (Hamlin, 2013). Further, Malle et al. (2014) reported that, at the age of 4 years, children had begun to understand that different intentions involve different moralities even if the results are the same.

Researchers have indicated that behavioral outcomes affect an individual's judgment of intentionality (Feltz & Cokely, 2007; Sinnott-Armstrong, Mallon, McCoy, & Hull, 2008). Knobe (2003a) examined the scenario of a company planning a profitable project, which the company's president agreed to undertake. In the situation of the project having side effects that damaged the environment, more of the participants (adults) who were asked whether the president damaged or improved the environment on purpose thought the decision was intentional, whereas in the situation of the side effects improving the environment, more adult participants thought the president's decision was unintentional. Therefore, judgments of intentionality by adults may have been affected by the result of the behavior being judged, and this influence was also commonly seen among children (Killen & Smetana, 2015). That is, when the result of a situation is negative—regardless of whether or not the agent had prior knowledge of the outcome—children aged 4 to 5 years regard it as intentional, but when the result is positive, children regard it as unintentional (Killen & Smetana, 2015).

In this study, we specifically explored the development of preschoolers' understanding of classic intentionality, skill intentionality, awareness intentionality, and moral judgments involving different outcomes of behavior. In relation to this, we formed the following hypotheses:

Hypothesis 1: The outcome of a situation will have a positive/negative effect on the intentionality and moral judgments of children aged 3 to 6 years; that is, a positive outcome will lead children to make intentional judgments and praise the behavior, and a negative outcome will lead children to make unintentional judgments and blame the behavior.

Hypothesis 2: As preschool children increase in age, intentionality conditions will become a stronger cue than situational outcomes will when making moral judgments.

Hypothesis 3a: In the classic intentionality task, children aged 3 to 4 years will make intentional/unintentional judgments and praise/blame the behavior when the outcomes are positive/negative, and children from 5 years will make intentional judgments when the behavioral agents are intentional and make unintentional judgments when agents are unintentional.

Hypothesis 3b: In the skill intentionality task, children aged from 3 to 6 years will make intentional/unintentional judgments and praise/blame the behavior when the outcomes are positive/negative whether or not the behavioral agents are intentional.

Hypothesis 3c: In the awareness intentionality task, children aged from 3 to 6 years will make intentional/unintentional judgments and praise/blame the behavior when the outcomes are positive/negative whether or not the behavioral agents are intentional.

Method

Participants

Participants were 344 preschoolers aged between 3 and 6 years, who were recruited from kindergartens in Beijing, China. We first contacted the kindergarten teachers and asked for permission to conduct this experiment. The teachers then handed out written consent forms to the children's parents, and only those children who returned signed forms were included in the experiments. There was an equal number of boys and girls in each age group and all participants completed the tasks (see Table 1).

Procedure

Children were tested individually in a separate room in the kindergarten, and completed one of the three tasks (classic intentionality, skill intentionality, or awareness intentionality) in about 5 minutes. Each task included four experimental conditions and the order of presentation was balanced by using Latin squares.

Experimental Materials

The experimental materials were based on the scenarios used by Mull and Evans (2010). Prior to use, professors and postgraduate students majoring in developmental psychology revised these materials by translating them into Chinese, and modifying the scenarios to be more relevant to Chinese children's daily life.

Classic intentionality task.

Situation 1: Xiaohong/Xiaoming walked into a room carrying a glass of water. When she/he saw a plant, she/he poured some water onto the plant so that it became greener.

Situation 2: Xiaohua/Xiaogang walked into a room carrying a glass of water. When she/he passed a plant, she/he accidentally poured some water onto it; thus, the plant became greener.

Situation 3: Xiaohuang/Xiaodong walked into a room carrying a glass of water. She/he poured some water on the ground and Xiaobai/Xiaojun slipped when she/he passed the puddle.

Table 1. The Number and Age Means and Standard Deviations of Participants Completing Each Task

Task	3		4		5		6	
	<i>N</i>	Months (<i>M</i> ± <i>SD</i>)	<i>N</i>	Months (<i>M</i> ± <i>SD</i>)	<i>N</i>	Months (<i>M</i> ± <i>SD</i>)	<i>N</i>	Months (<i>M</i> ± <i>SD</i>)
Classic intentionality	32	41.41 ± 3.66	20	54.65 ± 2.25	20	65.15 ± 1.93	32	74.69 ± 2.09
Skill intentionality	32	41.59 ± 3.00	32	55.66 ± 3.15	28	63.43 ± 2.97	32	73.03 ± 1.12
Awareness intentionality	32	41.34 ± 3.78	20	53.25 ± 3.35	22	64.86 ± 1.96	32	73.41 ± 2.28
Total	96	41.45 ± 3.46	72	54.71 ± 3.12	70	64.37 ± 2.50	96	73.71 ± 2.01

Situation 4: Xiaoqing/Xiaobing walked into a room carrying a glass of water and she/he accidentally poured some water on the ground. When Xiaobai/Xiaojun passed, she/he slipped in the puddle.

Questions:

(1) Did he/she water the plant on purpose? Did she/he make Xiaobai/Xiaojun slip on purpose and why do you think so?" (To explore children's understanding of intentionality.)

(2) Should she/he be praised or criticized and why do you think so?" (To explore children's moral judgments regarding the protagonist.)

Skill intentionality task.

Situation 1: Xiaohong/Xiaoming was playing darts. She/he was good at the game and threw the dart into the bull's-eye.

Situation 2: Xiaohua/Xiaogang was playing darts. She/he was only 2 years old and threw the dart into the bull's-eye.

Situation 3: Xiaohuang/Xiaodong was playing darts. She/he was good at the game, but she/he hit the foot of a bird in a cage when she/he threw the dart.

Situation 4: Xiaoqing/Xiaobing was playing darts. She/he was only 2 years old, but she/he hit the foot of a bird in a cage when she/he threw the dart.

Questions were asked for skill intentionality, similar to those above for classic intentionality.

Awareness intentionality task.

Situation 1: Xiaohuang/Xiaodong was sitting at a table and doing some drawing. The television was on but she/he was not watching it. She/he looked at the paper so that she/he could see what she/he had drawn. On the paper, she/he drew a very beautiful landscape.

Situation 2: Xiaohong/Xiaoming was sitting at a table and doing some drawing, but her/his eyes were on the television so she/he did not look at the paper. On the paper, she/he drew a very beautiful landscape.

Situation 3: Xiaoqing/Xiaobing was sitting at a table and doing some drawing. The television was on but she/he was not watching it. She/he was looking at the paper so she/he could see what she/he was drawing. What she/he had drawn went beyond the edge of the paper and onto the table.

Situation 4: Xiaohua/Xiaogang was sitting at a table and doing some drawing, but her/his eyes were on the television so she/he did not look at the paper. What she/he had drawn went beyond the edge of the paper and onto the table.

Questions were asked for awareness intentionality, similar to those above for classic intentionality.

Data Analysis

We first calculated the number of children who made the same responses in each condition, then used SPSS version 19.0 to perform statistical analyses.

Crosstabs were used to explore whether or not there were statistically significant differences across the four age groups in relation to making intentionality or moral judgments under the four conditions in the classic intentionality, skill intentionality, and awareness intentionality tasks, respectively. Next, Cochran's Q tests were used to determine the differences across the four intentionality conditions for each age group in each of the three tasks. We conducted McNemar's test to investigate further the differences among the four conditions.

The questions asking children the reason for their judgments were not included in the data analysis. They were used in the discussion to help explain why children made such judgments.

Results

Role of Situation Outcomes and Intentionality Conditions in Intentionality Judgments

Table 2 displays the number of children making intentionality judgments across the four conditions for the three intentionality tasks.

Table 2. *The Number of Children Making Each Type of Judgment in Intentionality Tasks*

Task	Condition	Outcome	Age							
			3		4		5		6	
			I	U	I	U	I	U	I	U
Classic intentionality	Intentional	Positive	16	16	11	9	12	8	20	12
		Negative	13	19	12	8	12	8	16	16
	Unintentional	Positive	12	20	9	11	5	15	6	26
		Negative	12	20	4	16	1	19	3	29
Skill intentionality	High skill	Positive	17	15	18	14	19	9	24	8
		Negative	7	25	12	20	9	19	6	26
	Low skill	Positive	13	19	17	15	18	10	13	19
		Negative	5	27	8	24	8	20	2	30
Awareness intentionality	Awareness	Positive	21	11	8	12	11	11	24	8
		Negative	19	13	9	11	13	9	19	13
	Unawareness	Positive	20	12	11	9	8	14	12	20
		Negative	21	11	8	12	7	15	10	22

Note. I = the number of children who thought the behaviors were intentional, U = the number of children who thought the behaviors were unintentional.

Classic intentionality task. In the unintentional with negative outcome condition, the number of children making one judgment or another varied in all four age groups, $\chi^2(3, n = 104) = 11.49, p < .01$, but there were no significant differences in the other conditions ($ps > .05$). Post hoc test results, comparing 3-year-olds with 4-year-olds, 5-year-olds and 6-year-olds; 4-year-olds with

5-year-olds and 6-year-olds; and 5-year-olds with 6-year-olds demonstrated that in the unintentional with negative outcome condition, the number of 5- and 6-year-old children making an unintentional judgment, $\chi^2(1, n = 52) = 6.93, p < .01$, was significantly greater than the number of 3-year-old children, $\chi^2(1, n = 64) = 7.05, p < .01$. In the other conditions, there were no significant differences ($ps > .05$).

Children aged 4, 5, and 6 years showed significant differences in intentionality judgments across the four conditions: in 4-year-olds, Cochran's $Q(3) = 11.40, p < .01$; in 5-year-olds, Cochran's $Q(3) = 18.41, p < .001$; and in 6-year-olds, Cochran's $Q(3) = 26.26, p < .001$; however, 3-year-olds did not show any significant differences across the intentionality conditions, Cochran's $Q(3) = 1.68, p > .05$. Results of McNemar's test revealed that, when the outcomes were negative, 4-year-olds tended to regard actions conducted on purpose as intentional, and the number of these children was significantly higher than that of children who regarded actions conducted by accident as intentional ($p < .05$). Regardless of the valence of the outcome, there were more children aged 5 ($p < .05$ in positive and $p < .01$ negative outcome conditions) and 6 ($p < .001$ in positive and $p < .01$ negative outcome conditions) years who regarded actions conducted on purpose as intentional than children who regarded actions conducted by accident as intentional. No significant differences were found in other conditions ($ps > .05$).

Skill intentionality task. Among the four age groups, there were no differences in the numbers of children making each judgment across the four intentionality conditions ($ps > .05$). However, each age group showed significant differences in intentionality judgments across the four conditions: in 3-year-olds, Cochran's $Q(3) = 15.60, p < .001$; in 4-year-olds, Cochran's $Q(3) = 9.14, p < .05$; in 5-year-olds, Cochran's $Q(3) = 15.54, p < .001$; and in 6-year-olds, Cochran's $Q(3) = 36.76, p < .001$. Results of McNemar's test revealed that children in all four age groups tended to regard actions with positive outcomes as intentional, regardless of the valence of the outcome, and the number of these children was significantly higher than that of children who regarded actions with negative outcomes as intentional (3-, 4-, and 5-year-olds in high/low skill conditions, $ps < .05$; 6-year-olds in high/low skill condition, $p < .001/p < .01$). In addition, when the outcomes of actions were positive, significantly more 6-year-olds regarded protagonists with high skill levels as behaving intentionally compared to 6-year-olds who regarded protagonists with low skills as behaving intentionally ($p < .01$).

Awareness intentionality task. Under the conditions of awareness with positive outcome and no awareness with negative outcome, there were significant differences in the numbers of children making these two judgments in all age

groups, $\chi^2(3, n = 106) = 9.49, p < .05$; $\chi^2(3, n = 106) = 9.65, p < .05$, but there were no significant differences in the other conditions ($ps > .05$). Post hoc test results indicated that, under the condition of awareness with positive outcome, the number of 6-year-olds was significantly higher than those of 4-year-olds, $\chi^2(1, n = 52) = 6.37, p < .05$. When the actions were conducted without awareness following negative outcomes, the number of 3-year-olds was significantly lower than those of 5- and 6-year-olds, $\chi^2(1, n = 54) = 5.97, p < .05$; $\chi^2(1, n = 64) = 7.57, p < .01$. Finally, there were no significant differences among the other age groups ($ps > .05$).

Cochran's Q test results revealed that significant differences among the four intentionality conditions existed for 6-year-olds, Cochran's Q (3) = 14.82, $p < .01$, but not 3-, 4-, and 5-year-olds, Cochran's Q (3) = 0.51, $p > .05$; Cochran's Q (3) = 1.80, $p > .05$; Cochran's Q (3) = 4.08, $p > .05$. Results of McNemar's test further revealed differences across the four conditions among 6-year-olds: in the positive outcome condition, significantly more children tended to judge actions conducted with awareness as intentional, compared to those judging actions conducted without awareness as intentional ($p < .01$). There were no significant differences for the other conditions ($ps > .05$).

Role of Situation Outcomes and Intentionality Conditions in Moral Judgments

Table 3 displays the number of children making moral judgments across the four conditions for the three intentionality tasks.

Table 3. *The Number of Children Making Each Type of Judgment in Moral Judgment Tasks*

Task	Condition	Outcome	Age							
			3		4		5		6	
			P	C	P	C	P	C	P	C
Classic intentionality	Intentional	Positive	20	10	16	4	20	0	28	4
		Negative	2	29	2	18	0	20	0	32
	Unintentional	Positive	21	11	17	3	16	4	25	7
		Negative	7	25	3	17	4	16	2	30
Skill intentionality	High skill	Positive	31	1	31	1	24	4	32	0
		Negative	6	26	3	29	2	26	0	32
	Low skill	Positive	31	1	31	1	22	6	32	0
		Negative	4	28	5	27	2	25	2	30
Awareness intentionality	Awareness	Positive	31	1	18	2	22	0	31	1
		Negative	3	29	3	17	2	20	1	31
	Unawareness	Positive	25	7	20	0	17	5	23	9
		Negative	2	30	2	18	0	22	2	30

Note. P = the number of children who thought the behaviors should be praised, C = the number of children who thought the behaviors should be criticized.

Classic intentionality task. There were significant differences in moral judgments across the four conditions: in 3-year-olds, Cochran's $Q(3) = 38.72$, $p < .001$; in 4-year-olds, Cochran's $Q(3) = 32.83$, $p < .001$; in 5-year-olds, Cochran's $Q(3) = 45.33$, $p < .001$; and in 6-year-olds, Cochran's $Q(3) = 69.74$, $p < .001$. Results of McNemar's test revealed that, whether or not the protagonists' actions were intentional, children tended to praise actions that had positive outcomes, and the number of these children was significantly higher than that of children praising actions that had negative outcomes ($ps < .001$). No significant differences were found in the other conditions ($ps > .05$).

Skill intentionality task. Cochran's Q test results showed that there were significant differences in moral judgments across the four conditions: in 3-year-olds, Cochran's $Q(3) = 75.33$, $p < .001$; in 4-year-olds, Cochran's $Q(3) = 74.34$, $p < .001$; in 5-year-olds, Cochran's $Q(3) = 60.41$, $p < .001$; and in 6-year-olds, Cochran's $Q(3) = 91.71$, $p < .001$. Post hoc test results revealed that, regardless of the protagonists' skill, children tended to praise actions with positive outcomes, and the number of these children was significantly higher than that of children praising actions with negative outcomes ($ps < .001$). No significant differences were found in the other conditions ($ps > .05$).

Awareness intentionality task. Cochran's Q test results showed that there were significant differences in moral judgments across the four conditions: in 3-year-olds, Cochran's $Q(3) = 72.30$, $p < .001$; in 4-year-olds, Cochran's $Q(3) = 47.78$, $p < .001$; in 5-year-olds, Cochran's $Q(3) = 51.58$, $p < .001$; and in 6-year-olds, Cochran's $Q(3) = 71.24$, $p < .001$. Post hoc test results revealed that, regardless of the protagonists' awareness, children tended to praise actions with positive outcomes, and the number of these children was significantly higher than that of children praising actions with negative outcomes ($ps < .001$). In addition, when the outcome of the actions was positive, significantly more 6-year-olds praised protagonists with awareness than 6-year-olds who praised protagonists without awareness ($p < .01$), and no significant differences were found in the other conditions ($ps > .05$).

Discussion

Influence of Situation Outcomes and Intentionality Conditions on Intentionality Understanding in Children Aged 3 to 6 Years

In the classic intentionality task, when the outcomes were negative, 4-year-old children tended to understand that people who did something on purpose were acting intentionally; however, when the outcomes were positive, children's judgments were not based on agents' intentions. Therefore, 4-year-old children were more sensitive to negative than to positive situations (He & Xu, 2009; Wang, Wang, Wu, & Lu, 2012). The intentionality judgments of 5- and 6-year-old

children were based on intentions regardless of situation outcomes. Thus, from the age of 5 years, children's judgments of intentionality were not influenced by behavioral outcomes and they showed a much more mature understanding than did those younger than 5 years. These results are in line with those of Nobes, Panagiotaki, and Pawson (2009), who found that the majority of children aged between 3 and 8 years made the right judgments about intentionality, and a small number of children made judgments about intentionality based on behavioral outcomes alone.

In the skill intentionality task, children's intentionality judgments were affected by behavioral outcomes regardless of agents' skill level. Children were more likely to believe that behaviors leading to good results were intentional, whereas those leading to bad outcomes were unintentional. These results are not consistent with those of Mele (2001) and Knobe (2003b), who found that people tend to think that immoral behaviors leading to bad results are intentional. A possible explanation for this finding was put forth by Nobes et al. (2009), who reported that when outcomes were negative, children tended to think behaviors were unintentional and resulted from negligence. Similarly, we discovered that children still thought that bad behaviors with negative outcomes were unintentional even if the agents had high skill levels, so that these outcomes were attributed to negligence. In addition, in good outcome conditions, 6-year-old children's intentionality judgments were affected by skill, which is in line with adults' judgments (Guglielmo & Malle, 2010). That is, high-skill agents' behaviors are judged as being intentional, whereas low-skill and no-skill agents' behaviors are judged as being unintentional.

In the awareness intentionality task, we found that, for positive outcome conditions, only 6-year-old children's intentionality judgments were affected by awareness. These children tended to believe that behavioral agents acting with awareness were intentional while agents acting without awareness were unintentional, which is in line with the findings of Malle and Knobe (1997). The judgments made by other age groups were not significantly related to outcomes or intentionality conditions, which may be because young children do not fully understand the meaning of awareness intentionality. Under the conditions without awareness, 6-year-old children thought that the agents watching television just wanted to draw a picture on the table or draw a landscape, so the actions were judged as intentional. Therefore, children aged 6 years already consider the influences of outcomes and intentionality conditions on intentionality judgments.

Influences of Situation Outcomes and Intentionality Conditions on the Moral Judgments of Children Aged 3 to 6 Years

In all three tasks, regardless of whether the agent was behaving intentionally or unintentionally, children tended to praise behaviors leading to good results

and criticize behaviors leading to bad results. This indicates that, when making moral judgments, children aged 3 to 6 years are results oriented and neglect to take account of agents' intentionality. This result is in line with the findings of Guglielmo and Malle (2010). However, in the positive outcome conditions for the awareness intentionality task, we found that 6-year-old children's moral assessments were affected by intentionality. Specifically, they tended to praise intentional behaviors and criticize unintentional ones, which indicates that children aged 6 years had started to consider complex mental states and make comprehensive judgments by combining these with outcome judgments. This finding is in accordance with the assertion made in moral cognitive development theory that young children mainly focus on behavioral outcomes and the seriousness of the outcomes when making moral judgments. Then, with increasing age, children also start to think about the agent's mental states (Killen & Smetana, 2015). On the basis of Kohlberg's (1973) theory of the stages of moral development, the 3–6-year-old period covers the preconventional level, in which children usually make moral judgments according to behavioral outcomes. However, as they grow older, children enter the conventional level and start to consider agents' motivation and social rules. Our results support this theory. In addition, Duan, Mo, Fan, and Liu (2012) found that younger children pay more attention to the influence of results when making moral judgments, whereas older children combine mental states and cause–effect relationships.

However, Jones and Thomson (2001) discovered that children tend to make positive moral judgments about behaviors leading to good results and moderate moral judgments about behaviors leading to bad results. This is because children are unwilling to make severe moral judgments when an agent's intentions are unclear. In our study, moral judgments involved a forced-choice method, letting the children make a choice between “praise” and “criticize,” which might have led to the differences in our findings compared with those of other researchers.

Study Limitations and Future Research Directions

There are two main limitations to this study. First, children's understanding of awareness intentionality had developed at the age of 6 years, but it remains to be seen when exactly children obtain this ability. Second, we used yes-or-no, or two-option, forced-choice responses for most questions in our experiments; thus, even when children did not know the answer, we still asked them to make a judgment. This may have meant that children of different ages adopted a common response tendency in answering the questions. Future researchers could include a medium choice of “neither praise nor criticize” to improve the validity of the study design.

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