Developing Notions of Free Will: Preschoolers' Understanding of How Intangible Constraints Bind Their Freedom of Choice

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Abstract

Our folk psychology involves the ability to reason about free will. In a series of experiments, we looked at young children's ability to reason about their own freedom of choice, and contrast this with their ability to reason about situations that constrain it. We asked preschoolers (Range: 4 y; 1 mo. – 5 y; 7 mo.) whether they had the choice to *have done otherwise* when they did not have the necessary knowledge to do so (epistemic constraint), had the moral duty not to do so (moral constraint), preferred not to do so (preference constraint), were told not to do so (permissive constraint), or were told that everyone else did not do so (conformist constraint). Results suggest that while preschool children generally believe their actions are freely chosen, they also understand how psychological, social and moral considerations may constrain their actions. These results have implications for children's developing notions of free will and moral reasoning.

Keywords: preschoolers, freedom of choice, morality, epistemic states

Introduction

Free will has long been studied in the field of philosophy, social psychology, and more recently, cognitive neuroscience (Baer, Kaufman, & Baumeister, 2008; Kane, 2002; Soon, Brass, Heinze, & Haynes, 2008; Wegner, 2003). Recent work has also begun to investigate how this important intuition develops and takes form in young children's reasoning (Kushnir, Wellman, & Chernyak, 2009; Nichols, 2004; Seiver, Kushnir, & Gopnik, 2009).

For example, Nichols (2004) found that six-year-old children ascribe the choice to *have done otherwise* to an agent, but not an inanimate object. Therefore, Nichols (2004) posits an *agent-causal view* of free will in which children believe that agents have indeterminate choice which is unbound by outside forces. This is contrasted with children's beliefs about physical causation, namely that, unlike agents, inanimate objects are *not* free to choose their own course of action and are wholly governed by outside forces.

However, the distinction between agents and inanimate objects is only part of our adult intuitions about freedom of choice. More central to our mature understanding – and to the important role that intuitive notions of free will play in our social and moral reasoning – is the ability to contrast situations in which agents are free to choose and situations in which agents are constrained in their choices. In other words, to adults, "free will can't really mean that at any moment a person's behavior is totally unpredictable (and therefore entirely unconstrained)" (p.4; Baer et al., 2008). Therefore, understanding free will implies understanding the complementary notion of *constraint*.

Kushnir et al. (2009) asked four- and five-year old children if they *could have done otherwise* in two situations. One in which they were free to draw a picture and one in which they were physically prevented from doing so (i.e., the experimenter held the child's hand so that it was stuck in one place). Children overwhelmingly responded that they had freedom of choice when they were physically unbounded, but responded that they did not have that freedom when they were physically constrained. Therefore, preschoolers may already know that their agency, and therefore their freedom of choice, is limited by the physical world.

However, the physical world is just one type of force that may constrain one's free will. One's freedom to choose may also be constrained, or at least limited, by non-physical phenomena, such as beliefs, knowledge states, desires, and social and moral obligations. Research on children's social cognition shows that preschoolers have a rather firm grasp of how constraints which come from the mind differ from those of the physical world (Inagaki & Hatano, 1999, Wellman, 1990). In the current investigation, we explore two related questions about such "intangible" constraints: First, do young children understand that these constraints bind their freedom of choice? Or alternatively, do they believe that their ability to *have done otherwise* is unbounded by psychological and social forces, and is subject only to the laws of the physical world? Second, can children distinguish between intangible constraints which fully determine behavior (and thus fully constrain free will) and those which only influence it (and thus do not fully constrain free will)?

Experiments 1 and 2 explored the first question by asking older and younger preschool children whether they believed they *had the choice to do otherwise* when they didn't have the necessary knowledge to do so. We chose this epistemic constraint – that seeing leads to knowing – because it is one

with which children are quite familiar (Wellman, 1990). Critically, this constraint fully limits one's free will, much like a physical constraint. Thus, we predict that, if children understand intangible (non-physical) constraints, the results should replicate Kushnir et al.'s (2009) findings.

Experiment 3 explored the second question by asking preschoolers about their freedom to act against constraints which, by adult intuitions may influence behavior, but do not fully constrain one's free will. Therefore, we asked children whether they believed they *had the choice to do otherwise* when bound by moral considerations, personal preference, permission, and conformity.

Experiment 1

In Experiment 1, a group of older preschoolers (4.5- 5-year-olds) were asked to reproduce two shapes from a modeled drawing. Across two trials, we varied when each child had the ability to see (thus, to know about) a modeled shape. In the *Constrained Drawing* trial, the modeled shape was hidden from the child's view behind an occluder. In the *Free Drawing* trial, the modeled shape was visible. After drawing, children were asked if they *could have done otherwise* – that is, if they could have drawn the shape they didn't see (and therefore didn't draw) in the Constrained Drawing trial, or if they could have drawn the shape that they did see (but didn't draw) in the Free Drawing trial. We also asked them to explain their responses. If children understand the epistemic constraint binding their free will, then their responses and explanations should differ across the two trials.

Method

Participants 22 four- and five-year-old children (Mean age = 4 y; 11 mo.; SD = 6 mo.) were recruited from preschools in Ithaca, NY.

Procedure Children were interviewed individually in a separate room in the preschool by a female experimenter. Four colored placemats (randomly chosen and ordered from a set of red, orange, green, yellow, blue, and brown), were used to distinguish between the individual trials. The occluder was a black piece of construction paper.

The set-up is shown in Figure 1. The experimenter began by first showing children a drawing of a dot (Shape B) and asking the child to label it. This was followed by the Free and Constrained Drawing trials, order counterbalanced. Each of these trials consisted of an action (drawing a shape), an outcome (the shape) and two critical questions (Alternate Choice Judgment and explanation).

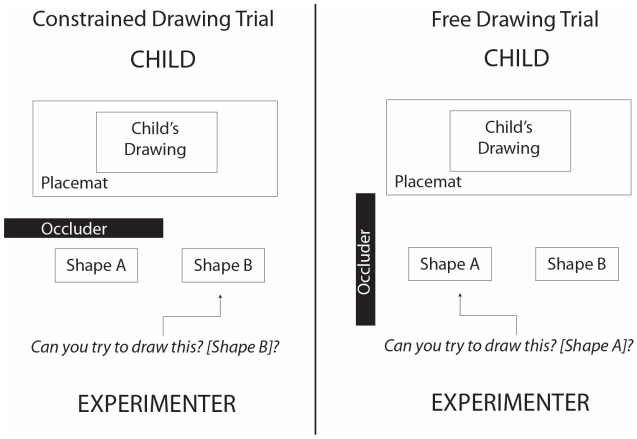

Figure 1: Set-up of Experiment 1.

Action: The experimenter drew Shape A, hidden by the occluder, saying "And now, I'm going to put the paper up like this and draw a different shape." Shape A was either a line or a circle (randomly chosen).

Outcome: The Experimenter then asked the child to draw the hidden shape ("Can you try to draw this?"). If the child refused to draw, the experimenter encouraged them to draw Shape B. Ten children drew Shape B, and 12 drew something on their own.[1] After the child finished drawing, the experimenter revealed the hidden shape ("Now I'm going to show you what I drew!")

Questions: The colored mat was then set aside and children were asked the *Alternate Choice Judgment*: "Last time, on the [blue] mat…could you have drawn the [line]?" The child was then asked to *explain* his/her response.

Coding Explanations were coded and classified into the following four categories: References to Epistemic Constraints ("because the paper was up and I couldn't see it"; "because this time the paper wasn't up"); Enactments ("by going like this"), Non-Explanations ("because there was a dot there"; "I don't know"), and References to Other Constraints ("because you told me to draw this one.").

Results and Discussion

Figure 2 shows that children's responses to the Alternate Choice Judgment were marginally different between conditions. In the Free Drawing trial 12/22 (54.5%) children indicated that they could have drawn the other shape. In contrast, only 8/22 (36%) of the children said they could have drawn the hidden shape in the Constrained Drawing trial (McNemar's $p = .07$, one-tailed).

[1] Analyses revealed no differences between these two groups

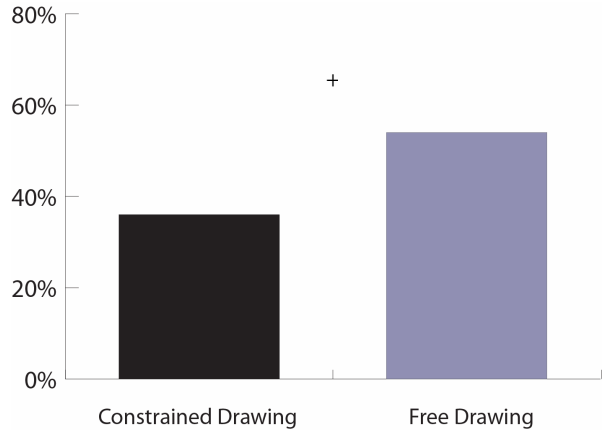

Figure 2: Percentage of children who said that they "could have drawn something else" in Experiment 1.

Figure 3 shows the same pattern in children's explanations. The majority of explanations (54.5%; 12/22) in the Constrained Drawing trial appeal to the epistemic constraint imposed in the task. Epistemic explanations were provided more often than non-explanations, χ^2 (1, N = 15) = 5.40, $p < .05$, enactments, χ^2 (1, N = 16) = 4.00, $p < .05$, and other constraints, χ^2 (1, N = 15) = 5.40, $p < .05$. In contrast, in the Free Drawing trial children mostly provided enactments and non-explanations. In the Free Drawing trial, enactments were provided most often, significantly more often than references to epistemic constraints, χ^2 (1, N = 11) = 4.46, $p < .05$ and the proportion of enactments was not significantly different from the proportion of non-explanations and references to other constraints (all *p*s non-significant).

Like children's judgments, children's explanations differed significantly between trials. Children were significantly more likely to provide epistemic explanations in the Constrained Drawing trial than in the Free Drawing trial (McNemar's $p = .001$, one-tailed). Similarly, a greater proportion of children in the Free Drawing trial explained their response by enactment (demonstrating the alternate action) (McNemar's $p < .05$, one-tailed). The proportion of non-explanations and references to other constraints did not differ significantly between trials.

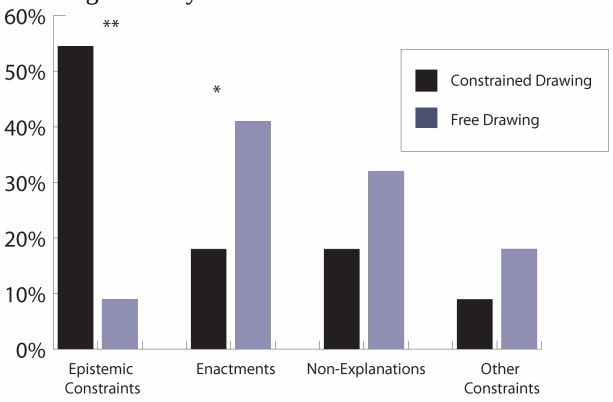

Figure 3: Proportion of Explanation Types within Each Trial in Experiment 1

Experiment 2

In Experiment 1, older preschoolers' judgments and explanations revealed some ability to reason about epistemic constraints on free will. In Experiment 2, we replicated the task with a sample of younger preschoolers, and also made a few critical modifications to the procedure. First, we included a warm-up to prime children to think about knowledge states. Second, we eliminated the ambiguity in the Constrained Drawing trial of what the child was supposed to draw by doing away with Shape A (see Figure 4). Thus, the experimenter had only one drawing in front of her (hidden or visible, depending on the condition). Note also that, in this modified procedure, children were free to draw whatever they wanted to in both trials except, of course, the picture they could not see.

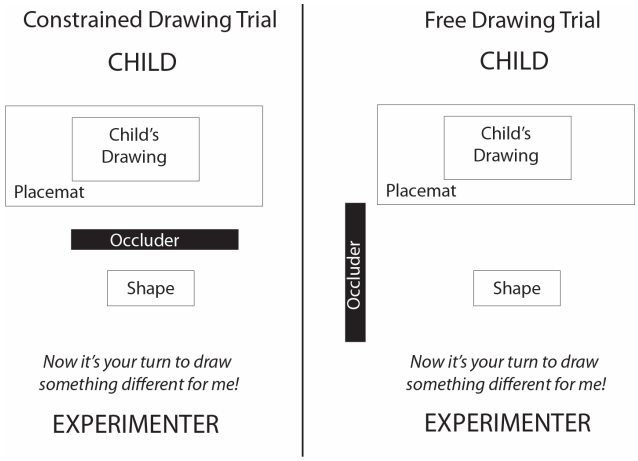

Figure 4: Set-up of Experiment 2

Method

Participants 26 four-year-old children (M=4 y; 6 mo; SD=4.8 mo) were recruited from preschools in Ithaca, NY, Cortland, NY, and New York, NY. The ages of these children was significantly lower than of those in Experiment 1, $t(46) = 3.58$, $p < .01$. All preschools were roughly matched for socioeconomic status and demographic population.

Procedure *Knowledge Access Warm-Up:* In order to prime children to think about knowledge states, we began with a knowledge access task (Wellman & Liu, 2004). In this procedure, children were shown a drawer with hidden contents, asked to guess the contents of the drawer, and then prompted to open the drawer, revealing a toy dog. The drawer was then closed and a doll ignorant to the contents of the drawer was introduced ("Now Polly has never ever seen inside this drawer. Here comes Polly!"). Children were then asked two questions pertaining to the doll's knowledge state: "Does Polly *know* what's in the drawer?" and "Has Polly *seen* inside the drawer?" 85% (22/26) of the children

answered both questions correctly. Corrective feedback was not provided.

The experiment then continued with the same two trials (Free Drawing and Constrained Drawing) as in experiment 1. As shown in Figure 4, the set-up was simplified to include only one drawing in front of the experimenter (either hidden or visible) and a blank sheet of paper in front of the child. The experimenter first drew her shape, then she asked the child "can you see it?" She then prompted the child to draw by saying, "Now it's your turn to draw something different for me!" After both drawings, the experimenter revealed her shape (if hidden) and asked the Alternate Choice Judgment and explanation questions. Coding was the same as in Experiment 1.

Results and Discussion

The results replicate the findings of Experiment 1 with younger preschoolers. Figure 5 shows that children's responses to the Alternate Choice Judgment were significantly different across conditions. In the Free Drawing trial, 17/26 (65%) of children answered that they could have drawn the other shape, whereas only 9/26 (35%) did so in the Constrained Drawing trial (McNemar's $p < .05$, one-tailed).

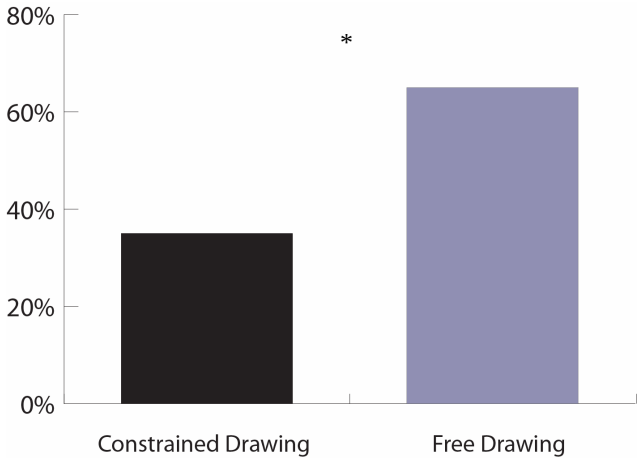

Figure 5: Percentage of children who responded they "could have drawn something else" in Experiment 2

Though younger children provided fewer explanations overall, of the 54% (14/26) of children who provided explanations, 36% (5/14) referred to epistemic constraints in the Constrained Drawing trial, whereas no child referred to epistemic constraints in the Free Drawing trial (McNemar's $p < .05$, one-tailed). This difference is consistent with the pattern of explanations provided by the older preschoolers in Experiment 1. The difference between the proportion of non-explanations, enactments, and references to other constraints in the Free and Constrained drawing trials were not significant.

Experiment 3

Experiments 1 and 2 revealed that 4- and 5-year-olds can reason about their own free will and epistemic constraints on their free will. These results provide initial evidence that young children may already understand that their freedom to act can be restricted by non-physical, intangible constraints.

Experiment 3 focused on other intangible constraints which influence, rather than fully limit, free will – moral considerations, personal preferences, permission, and conformity. Research has shown that even three-year-olds are sensitive to moral rules (e.g., Smetana, 1981) and the subjective nature of preferences (Wellman, 1990, Wellman & Woolley, 1990; Repacholi & Gopnik, 1997). Young children are further able to reason about how rules of permission (Kalish & Shiverick, 1995); and conformist considerations (Kalish, 1998; Racoczy, Warneken, & Tomasello, 2008) may determine one's actions. Do children also believe that these factors constrain their freedom of choice? If so, do they consider these four influences to be equally constraining, or do they distinguish among them?

Participants Participants were 15 four- and five-year olds (Mean age = 4 y; 7 mo.; SD = 4.5 mo) recruited from preschools in Ithaca, NY, Cortland, NY, and New York, NY. Preschools were roughly matched for socioeconomic status and demographic population.

Procedure All children completed four trials (randomly ordered): Moral Trial, Preference Trial, Permissive Trial, and Conformist Trial. In each trial, children began by being shown two shapes (randomly chosen from a set of 8: a dot, a line, a circle, a square, a triangle, a squiggly line, an X, and a U). Each child was then given a white piece of paper on a colored mat and introduced to one of four puppets (a dog, a cat, a pig, or an elephant; randomly chosen).

In the *Moral Trial*, children were asked to act in accordance with a moral obligation: "This is [Doggie]. [Doggie] *hates* [triangles]. [Triangles] remind him of something *really* sad, and sometimes, when he sees them, he even cries! Can you draw the [circle (i.e, other shape)]? In the *Preference Trial*, children were told: "This is [Piggy]. [Piggy] really likes to watch people draw! She wants you to draw whichever one of these shapes you like the best. Can you draw the one you like the best?" Children were then prompted to draw one of the two shapes they had just seen. In the *Permissive Trial*, the experimenter asked the child to act in accordance with a non-moral rule: "This is [Kitty]. [Kitty] says the rule is you *have* to draw a [squiggly]. She says that's the rule and you have to do it. Can you draw a [squiggly]?" Finally, in the *Conformist Trial*, children were asked to do as everyone else has done: "This is [Ellie]. [Ellie] just played with lots of boys and girls and all of them drew a [line]. She says *every* one of them drew a [line]. Can you draw a [line]?"

After each trial, the colored placemat was set aside, and children were asked the Alternate Choice Judgment and explanation questions (as in Experiments 1 and 2).

Coding

Explanations were coded into the following six categories: references to Moral Constraints ("because it would make Doggie sad"), Preferences ("because I wanted to draw the square"), Permissive Constraints ("because Doggie said to draw the line"), Conformist Constraints ("because all of my friends did it"), Enactments ("by going like this"), and Non-Explanations ("because there was a dot there"; "I don't know").

Results and Discussion

The results show that, to a large extent, 4- and 5-year-old children believe their free will is constrained by all four contexts. Overall, 77% (46/60) responses to the Alternate Choice Judgment question were "no's" and 67% (40/60) of the explanations refer to one of the coded constraints. However, there were also important differences between the four constraints in both judgments and explanations.

Figure 6 shows that a significant majority of children (87%; 13/15) indicated that they did not have the choice to act immorally (Binomial $p < .05$) or against conformity (87%; Binomial $p < .05$). A non-significant majority indicated that they could not act against permission (60%; 9/15), or their own preference (73%; 11/15).

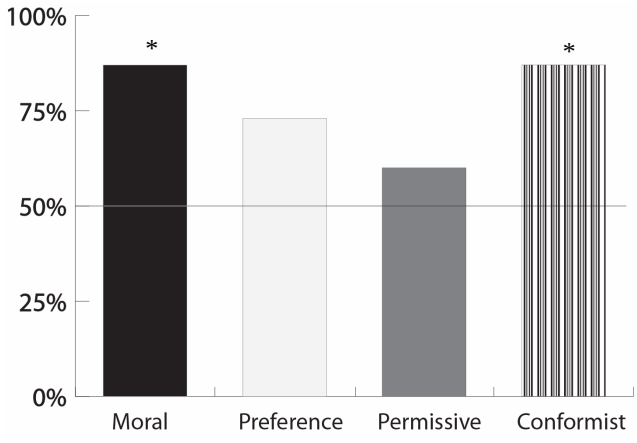

Figure 6: Percentage of children who answered they "could *not* draw something else" in Experiment 3

Figure 7 shows the proportion of each type of explanation that children gave in each trial. In the Moral Constraint trial, the majority (87%; 13/15), of children appealed to moral considerations in their explanations. Also, moral constraints were most often referenced in the moral trial than each of the other three trials (all McNemar's p's $< .01$, one-tailed).[2] In the Preference Constraints trial, approximately half (53%; 8/15) of children referred to preference considerations in their explanations. Preference constraints were references more often in this trial than each of the other three (all McNemar's p's $< .05$, one-tailed). In the permissive trial, only 33% (5/15) children referenced constraints of permission, and in the conformist trial, only 13% (2/15) referenced conformist constraints in their explanations. Moreover, the number of permissive and conformist explanations was low overall and did not significantly vary between trials. Enactments and non-explanations also did not significantly vary between trials.

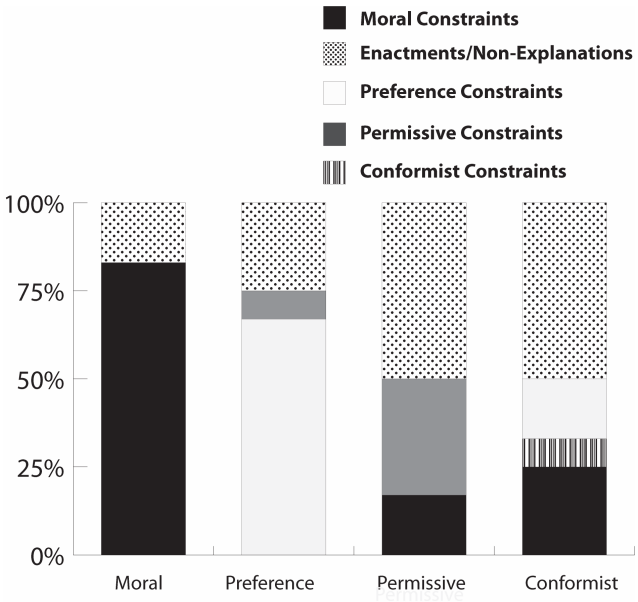

Figure 7: Proportion of Explanation Types within Each Trial in Experiment 3

The results suggest that children responded quite differently to each type of constraint. These differences are further illuminated by analyzing the relationship between children's judgments and their explanations. Only moral constraints were overwhelmingly judged and explained consistently and appropriately – 80% (12/15) of the children responded that they could not draw the other shape ("no" judgment) because it would make the puppet cry (Moral Constraint explanation). By the same analysis, preference constraints were also somewhat consistently evaluated – 47% (7/15) of the children said that they could not draw the other shape because they didn't like it as much. On the other hand, children's overwhelming "no" judgments in the Conformist trial were almost never followed by conformist constraint explanations – only 13% (2/15) of the children said they could not draw the other shape because no one else did. Also, only 20% (3/15) of the children said they could not draw it because those were the rules. Further research is needed to understand the reasons for these differences.

The most critical finding, then, is that children overwhelmingly said that they were not free to act to harm another person. One potential interpretation might be that

[2] Of those that referred to Moral Constraints in the other (non-moral) trials, all children experienced the Moral Trial before the trial in which they referenced the moral constraint, suggesting the presence of an order effect.

children felt "pressured" to state that they could not act immorally because a moral rule presented a "permissive" rule in some sense (Piaget, 1932/1997). However, children's explanations reveal that this is not the case – children referenced moral considerations ("because it would make Doggie cry") rather than permissive ones. Also, they were clearly less likely to say they were constrained by a simple rule (Permissive trial).

General Discussion

The results of these three studies show that by the time children are five years old they have an intuitive notion of free will that is sensitive to certain intangible constraints. Importantly, in contrast to the fact that children overinflate their own abilities (e.g., Stipek, 1984) preschool-aged children do not simply believe that their freedom to choose is limitless. Instead, preschool-aged children already appear to have notions of freedom of choice that are in-line with "compatibilist" (Hume, 1910) views (i.e., that some actions are fully or partially determined while others may be entirely unconstrained).

We also found that preschool children can reason about both wholly constraining (Experiments 1 and 2) and limiting (Experiment 3) influences on their past actions. Moreover, their responses indicate that they distinguish between different types of constraints. This is consistent with past work showing that young children understand the limiting nature of morality (Smetana, 1981; Yamada, 2008) and the nature of social norms (Kalish, 1998; Kalish & Shiverick, 1995). In adults, freedom of choice is linked to moral and normative behavior (Phillips & Knobe, in press; Vohs & Schooler, 2008). The current study suggests that this link is already present in very young children.

In the real world, social and psychological factors often come in conflict. For example, the desire to have your sister's toy may conflict with the moral judgment that grabbing it from her would make her cry. Future work could study how preschoolers reason about freedom of choice when these social and psychological factors conflict.

Acknowledgments

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