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How Universal Are Free Will Beliefs? Cultural Differences in Chinese and U.S. 4- and 6-Year-Olds

Adrienne O. Wente
University of California, Berkeley

Sophie Bridgers
Stanford University

Xin Zhao
Cornell University

Elizabeth Seiver
University of California, Berkeley

Liqi Zhu
Chinese Academy of Sciences

Alison Gopnik
University of California, Berkeley

This study explores the development of free will beliefs across cultures. Sixty-seven Chinese 4- and 6-year-olds were asked questions to gauge whether they believed that people could freely choose to inhibit or act against their desires. Responses were compared to those given by the U.S. children in Kushnir, Gopnik, Chernyak, Seiver, and Wellman (2015). Results indicate that children from both cultures increased the amount of choice they ascribed with age. For inhibition questions, Chinese children ascribed less choice than the U.S. children. Qualitative explanations revealed that the U.S. children were also more likely to endorse notions of autonomous choice. These findings suggest both cultural differences and similarities in free will beliefs.

Free will has long been a topic of debate in western philosophy. On one hand, we think of ourselves as agents with free will, as beings who can intentionally and autonomously choose what to do or not do. On the other hand, this conception seems to conflict with scientific determinism—the belief that events, either mental or physical, are always caused by preceding events. Recently, researchers have found that people tend to endorse a strong conception of free will (Nahmais, Morris, Nadelhoffer, & Turner, 2005; Pronin & Kugler, 2010). For example, adults believe that actions are consciously chosen and reject claims that free will, or choice, is an illusion (Monroe & Malle, 2010).

Adult concepts of free will may have many different components, which is part of why defining free will is philosophically problematic. However, one central prerequisite for a concept of free will is a belief in the ability of agents to freely choose to do otherwise—I feel that if I simply choose to raise my arm right now I could equally well have chosen to leave it by my side. Recently researchers have started to explore the development of these beliefs in children.

Beliefs about free will are a central component of folk psychology or theory of mind. Infants and toddlers demonstrate an early ability to reason about psychological causation (Kushnir, Xu, & Wellman, 2010; Repacholi & Gopnik, 1997). At 2 years of age, children explicitly hold a simple desire–perception psychology. They view people's actions as stemming directly from their preferences or desires combined with their perceptions. This simple syllogism undergoes considerable change during early childhood. By age 4 or 5, children explicitly view people much like adults do, as agents whose actions are guided by both desires and beliefs (Wellman & Lui, 2004; Wellman & Woolley, 1990).

A notion of free will, or choice, can be viewed as an added component to this causal chain. It is a causal gateway residing between the beliefs and

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Correspondence concerning this article should be addressed to Adrienne O. Wente, Department of Psychology, University of California, Berkeley, 3210 Tolman Hall, Berkeley, CA 94720. Electronic mail may be sent to adrieorchid@berkeley.edu.

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desires an individual holds and the actions in which they engage (Gopnik & Kushnir, 2014; Holton, 2009). In our everyday adult causal model of the mind, we seem to believe that a person can alter their actions and exercise free will through intervening on this intermediary causal link, regardless of the influence of preceding desires and beliefs.

To act freely implies that alternate choices are possible. To reason about free will, one must reason about what actually happened, or is likely to happen, as well as the other possibilities that might (have) come about. Thus, the ability to hold a belief about free will is closely tied to the ability to reason conditionally about the hypothetical future or the counterfactual past. Children also demonstrate an emerging ability to engage in conditional reasoning of this kind during their preschool years (Harris, German, & Mills, 1996).

Researchers have found that children as young as 4 years of age have intuitions about some of the prerequisites for free will. They believe that people have the ability to choose both to act and not act (Gopnik & Kushnir, 2014; Kushnir et al., 2015; Nichols, 2004). In one study, researchers (Kushnir et al., 2015) asked children if a story character, Mary, who was standing on a stool could choose to step off of the stool. In another version of the question, Mary had recently stepped off of the stool, and children were asked if she could have chosen to stay on the stool. These questions were contrasted with physically impossible questions. Children were asked if Mary could just choose to step off of the stool and float in the air or if Mary could have chosen to float in the air rather than step down to the ground. Four-year-olds answered that Mary could choose to step off of the stool or could have chosen to stay on the stool. However, they did not think that Mary could simply choose to float in the air.

Another set of experiments by Kushnir et al. (2015) found that children view epistemic constraints in a similar way. In these studies, children were asked to draw a picture while an experimenter also drew a picture, either within the child's view or not. Then children were asked if they could have chosen to draw the same picture as the experimenter. When they were unaware of what the experimenter was drawing, children believed they could not have chosen to draw the same picture. However, when children could see the experimenter's drawing, they answered that they could have chosen to draw the same picture. In this study, children understood that there could be psychological as well as physical constraints on choice. These results suggest that by age 4, children have a basic understanding of choice and what can constrain it, and that in the absence of obvious physical or epistemic constraints, they believe people can choose to do otherwise.

An additional question, however, is how children understand constraints on free will that might come from our desires. As adults we believe that free choice may be impossible because of physical or epistemic constraints, but we do not feel that our desires render choice impossible—even if we really want to do something we can choose to do otherwise. It is not difficult to find examples of this separation in adult folk psychological reasoning.

This belief actually involves two complementary beliefs: that we can freely choose to perform undesired actions and also that we can freely choose to inhibit desired actions. For example, to successfully lose weight, dieters must believe that they can choose to eat healthy food (even if they do not like it) and also that they can resist the temptation to eat unhealthy foods (even their favorite ones).

In these cases, we might describe the situation by saying that we have alternative desires—like the desire to lose weight or to eat one food rather than another—and having free will involves selecting among those desires. More profoundly, however, as adults, we also have the intuition that we have ultimate autonomy—that we can simply decide on a course of action regardless of our desires. In fact, as adults we believe that we even have the freedom to act in a perverse way, deliberately choosing to act in a way that goes against our desires. (The character Raskolnikov in Dostoevesky's Crime and Punishment, for example, acts perversely just as a way of asserting his free will.) Believing in the possibility of performing alternative actions, regardless of desires, constitutes a particularly strong intuitive conception of free choice.

Kushnir et al. (2015) also asked children what they thought about choices that were constrained by desires. Four- and six-year-old children were asked if they believed that they themselves or another person could choose to refrain from a desired action (not eat the cookie) or act against a desire (eat a disgusting cracker). Four-year-olds were less likely to ascribe free choice to other people and to themselves than 6-year-olds. They also were more likely to ascribe free choice to others than to themselves, and they were more likely to ascribe free choice in cases of action than of inhibition—they were more likely to say that someone

could choose to eat a disgusting cracker than that they could choose *not* to eat a tasty cookie.

Children were also asked to explain how an alternative action might come about. For example, if a child said that they could choose to not eat a cookie, the experimenter asked, "why can you choose to not eat the cookie?" Most children spontaneously described hypothetical conditions that might change someone's desires. For example, a child might say they could choose to not eat the cookie even if they wanted to because, "I'm too full" or "it has a lot of sugar." Although children provided "choose to" answers, their qualitative responses did not express a fully autonomous concept of choice. It is possible, instead, that these answers reflected the idea that alternative conditions, particularly alternative desires, could lead a person to act differently.

However, about 14% of children provided answers that specifically implicated an ability to willfully and autonomously practice self-control. For example, one child said, "you can choose even if you don't want to." These explanations suggest that some children, like adults, believe that actions are the result of fully autonomous choices, choices that can override desires.

One way to understand these developments is that between 4 and 6 years of age, children alter their causal model of the mind. They come to insert an autonomous notion of choice between a person's desires and actions. With this added causal variable, someone can change their course of action even if internal and external conditions remain the same. They can simply exercise their autonomous free will to choose to act otherwise.

What leads to these developmental changes in beliefs about free will? One very plausible answer is that changing free will beliefs stem from changing first-hand experiences of self-control. It is well known that children develop greater capacities for executive function and self-control during the preschool period. Between 4 and 6 years, children may simply have more experience of acting in spite of their own desires, for example, in circumstances that require self-control or executive monitoring. Children may reflect on their own desires and actions and note that they do not always match or they may simply experience themselves exercising their own executive capacities and interpret these capacities as free will. Endogenous, internally determined changes of this kind might explain the developmental trajectory in Kushnir et al. (2015).

But alternative accounts are also possible. It may also be that children gradually internalize the ideas about free will that prevail in their particular culture rather than inferring free will from their own experiences. If cultures have different approaches to free will, these different approaches might also be reflected in differences in children's conceptions. A strong version of this claim might be that children simply take on whatever account of free will prevails in their culture.

A weaker account might be that children integrate many different kinds of information in an attempt to form a single coherent account of the mind that includes conceptions of free will. These sources of information might include their own experiences of choice and self-control, their observations of choice and control in others, and, particularly significantly, culturally transmitted information about choice and control.

Studying cross-cultural similarities and differences in these developments can speak to these questions. Children from China have been shown to outperform children from the United States on executive function tasks (Lan, Legare, Cameron Ponitz, Li, & Morrison, 2011; Sabbagh, Xu, Carlson, Moses, & Lee, 2006). These differences might indicate that the endogenous development of self-control, though similar in kind, is accelerated in these children compared to children in the United States. In that case we might predict that children from China would ascribe more free will to people and do so at a younger age than children from the United States.

On the other hand, people from independent cultures have been found to place a greater emphasis on autonomy and agentive causation than people from interdependent cultures (Markus & Kitayama, 1991; Weisz, Rothbaum, & Blackburn, 1984). If culturally transmitted notions of individuality and autonomy influence beliefs about free will, it follows that children from more independently minded cultures may come to hold a more autonomous view of choice.

Few studies have assessed free will cross culturally. Sarkissian et al. (2010) surveyed adults in India, Hong Kong, Columbia, and the United States and found that across all four cultures, most people endorsed an indeterministic view of free will. In particular, participants believed that a person's decisions are not necessarily based on preceding events. Chernyak, Kushnir, Sullivan, and Wang (2013), on the other hand, found cultural similarities *and* differences in the development of attributions of choice made by Nepalese and U.S. 4- to 11-year-olds. Children from both cultures ascribed choice to people for simple actions, such as draw-

ing a picture, as long as these actions were not subject to physical or epistemic constraints. However, as the U.S. children grew older, they were more likely to say that a story character could choose to act against social norms and conventions. In Nepal, children's attributions of choice did not increase with age.

To further explore the relationship between culture and free will beliefs, the present study replicated Kushnir et al.'s (2015) Experiments 4 and 5. We asked 4- and 6-year-old Chinese children whether they or another person could freely choose to act against their own desires and compared their answers to those provided by the U.S. children in Kushnir et al. (2015).

Experiment 1

Chinese 4- and 6-year-olds were asked about the degree of choice they believed other people and they themselves had when they were either performing actions or refraining from actions that were in conflict with their desires. Following this, children were asked to provide a qualitative explanation for their responses. If children's free will beliefs stem from their experience of their own and others' executive functioning capacities, Chinese children might ascribe more choice to other people and themselves, because they are more likely to have such experiences. On the other hand, if more general cultural ideas about autonomy influence children's developing intuitions of choice, the U.S. children might have a more autonomous view of choice than Chinese children. Alternatively, children in the two cultures might develop in a similar way.

Method

Participants

Participants were sixty-seven 4- and 6-year-olds (M = 62 months, range = 47–82 months) recruited from a preschool in Beijing, China. An additional 22 participants were excluded from the study due to unknown birthdates (n = 8), incorrect age (the child was not 4 or 6; n = 2), experimenter error (n = 8), and missing audio files or inaudible responses (n = 4).

Chinese participants were predominantly middle class, spoke Mandarin, and were of the Han ethnicity. The U.S. data from Kushnir et al. (2015) were collected in Berkeley, CA. The sample was predominantly middle- and upper middle class and reflected the diversity of the local population.

Participants were randomly assigned to one of two between-subject conditions: the doll condition (4-year-olds: n = 18, M = 52 months; 6-year-olds: n = 16, M = 74 months) and the self condition (4-year-olds: n = 17, M = 52 months; 6-year-olds: n = 16, M = 74 months).

Stimuli

Doll condition. A small, female doll named Nini and small replicas of a wooden bed, a box, soup, and cake were used to act out the different stories.

Self condition. White index cards were used by the experimenter for drawing images representing the different food items and activities the children described.

Procedure

Children were tested individually by the experimenter in an empty classroom at their preschool. The procedure was modeled after Experiments 4 and 5 in Kushnir et al. (2015). The procedure was translated and back-translated by fluent Mandarin speakers to insure accuracy and cultural competence. Particular items were modified to be more culturally appropriate (e.g., instead of asking children about cereal they were asked about soup, a common breakfast food in China). The word "choose" was translated throughout using the Mandarin word "xuanze." Xuanze reflects the mental process of deciding between two or more possibilities and is very similar to the English "choose." "Have to" was translated throughout by the word "yiding." Yiding is used to express necessity or certainty and is quite similar to the English "have to."

Both conditions consisted of a warm-up phase, involving two question types: physically possible and impossible questions, and a test phase, involving three question types: physically impossible control questions, action (desire) questions, and inhibition (desire) questions. In the warm-up phase, children were asked whether Nini or they themselves could choose to perform physically possible or impossible actions if they really wanted to do so. In the test phase, the physically impossible questions also asked children if Nini (the doll condition) or if they themselves (the self condition) could choose to perform physically impossible actions. The action questions asked children if Nini or they themselves could choose to perform an undesirable action. The inhibition questions asked children if

Nini or they themselves could choose to refrain from performing a desirable action. More specifically, these experimental questions asked children about desires and contrasted "choose to" with "have to not" or "choose not to" with "have to" depending on the type of question, action or inhibition, respectively.

The order of the questions in the test phase was randomized across participants. The physically impossible control questions were always the third and fifth questions asked. The order of the "choose" option or the "have" option was counterbalanced within participants.

Doll condition. Children were told that they were going to play a game about things people can and cannot do. The experimenter then introduced children to a doll named Nini and instructed them to pretend she was "a real person just like you and me." The experimenter proceeded to ask children four warm-up questions that prompted them to think about possible and impossible physical choices. Each question began, "If Nini really wanted to, could she just choose to. . . (a) turn invisible; (b) smile; (c) jump up and down; and (d) run faster than a train." If children answered incorrectly, they were prompted until they responded correctly.

After the warm-up phase, the test phase began. The experimenter acted out six different stories. For the two physically impossible control questions, the experimenter asked if Nini could *choose to* {float in the air/walk through a wall} or if she *had to* {come down/walk around the wall}. For the action questions, the experimenter asked children if Nini could *choose to* {eat soup she thought was yucky/look under a bed of which she was afraid} or if she *had to not* {eat the soup/look under the bed}. For the inhibition questions, the experimenter asked children if Nini could *choose not to* {eat cake she thought was yummy/look in a box about which she was curious} or if she *had to* {eat the cake/look in the box}.

Self condition. The procedure for the self condition was identical in structure to the doll condition. However, instead of asking children about a doll, children were asked questions about themselves. Children were also told that their mom (or dad) said that it was ok to do the action or not do the action. (In pilot testing with the U.S. children, Kushnir et al. [2015] found that children often interpreted the "have to" question as a question about constraints imposed by adults unless this phrase was added.)

For the four desire test questions, children were asked to select a food and activity they really liked as well as a food and activity they really disliked. The experimenter then drew the children's selections on a card and used the card to discuss the scenario. For example, if a child said that ice cream was her favorite food, the experimenter then drew a picture of ice cream and said,

> Let's pretend that this is ice cream right here on the table in front of you. And you really like ice cream. You really think ice cream is yummy. Your mom says that you can eat the ice cream or not eat it. So do you *have to* eat the ice cream because you like it or could you *choose not to* eat the ice cream?

In contrast, if the child said that they did not like broccoli, the experimenter would draw a picture of broccoli and say,

> Let's pretend that this is broccoli right here on the table in front of you. You really do not like broccoli. Your mom says that you can eat the broccoli or not eat the broccoli. So do you *have to* not eat the broccoli because you don't like it, or can you *choose to* eat the broccoli?

Children's yes/no answers to the questions in the warm-up phase and choose/have answers to the questions in the test phase were recorded.

Qualitative responses. In both conditions, after each question, children were prompted to explain their response. For example, the experimenter would say, "and why can you choose to not eat the ice cream?" Qualitative responses were coded according to the coding scheme developed by Kushnir et al. (2015; Table 1).

Different codes were assigned depending on whether the child initially gave a "choose to" or "have to" answer. If children initially provided a "have to" answer, their answers to the open-ended questions were coded as *internal*, *external*, or *other*. Internal answers referred to mental factors internal to the agent that constrain choice. External answers referred to factors outside the agent that constrain choice. For example, if the child answered that Nini "had to" eat the cake, the child might say that this was so because, "She likes it" (internal) or because, "Cake is good" (external). Answers that were neither internal nor external, or both internal and external were coded as other.

If the children initially provided a "choose to" answer, their open-ended responses were coded as *alternate internal*, *alternate external*, *autonomous*, or *other*. Alternate internal answers referred to hypo-

Table 1
Qualitative Response Explanations and Examples

	Explanation of code	Example answers
"Have to"		
Internal	Mental factors that constrain choice, such as beliefs, desires, or other psychological factors.	"I like it" "I don't like running" "Because I'm afraid of spicy foods"
External	Constraints on choices that are external to the doll's mind. These include physical, biological, or social factors.	"Cake is good" "Nini is hungry" "It's good for you"
Other/I don't know/No response		
"Choose to"		
Alternate internal	Hypothetical internal conditions that allow for choice, such as a person's beliefs, desires, or other psychological characteristics.	"Maybe she's curious" "She doesn't know what the soup tastes like" "She is afraid that it is poisonous"
Alternate external	Hypothetical external conditions that allow for choice, generally reference physical, social, or biological factors.	"I can play outside if my good friends are there" "What if it's yummy" "There might be a gift from mom there"
Autonomy	A person holds the ability to practice choice independent of internal or external factors.	"You can choose not to play with blocks or play" "You can choose even if you don't want to"
Other/I don't know/No response		

thetical internal mental conditions, not specified in the story, in which a person would make the alternative choice, whereas alternate external answers referred to hypothetical external conditions in which a person would make the alternative choice. For example, if the child answered that the character could "choose to" eat the yucky soup, they might further explain that she could choose to do so "because she's curious" (alternate internal), or "because it's healthy" (alternate external).

Autonomous answers, in contrast, referred to a person's general ability to make a choice. For example, in response to the question "why can you choose to eat the yucky food?" the child might say, "you can choose even if you don't want to" or "she's herself and she can just choose what she wants to do." All answers that did not fit into this coding scheme were coded as other.

Two coders fluent in Mandarin and English were trained on this coding scheme. First, fidelity to the coding presented in Kushnir et al. (2015) was assessed using a subset of the U.S. data. Both research assistants scored above 90% agreement. Following this, they coded all Chinese data directly from audio recordings of the experiment. Reliability between coders for qualitative explanations was 88.43%. Coder agreement for the "choose to" or "have to" response was 97.9%. The two coders met to resolve discrepancies.

Results

The U.S. children's responses from Kushnir et al. (2015) were directly compared to Chinese children's responses. For each of the two agent conditions (self and other), children were asked to answer three question types (action, inhibition, and physically impossible control). For each of these three question types, children were asked to answer two questions. Responses across these two questions did not differ and were combined for further analysis.

Children received a 1 for each "choose to" response and a 0 for each "have to" response. For each question type, children were assigned a score ranging from 0 to 2. A score of 0 meant that the child provided two "have to" responses, whereas a score of 2 meant that the child provided two "choose to" responses. Figure 1 provides means, standard errors, and comparisons to chance. Inspection of Figure 1 shows that response patterns differed across the 3 question types. Accordingly, data were analyzed using a three-way analysis of Culture × Agent × Age for each question type.

Impossible Control Questions

A 2 (Culture: Chinese vs. U.S., between subjects) × 2 (Agent: self vs. other, between subjects) × 2 (Age: 4 vs. 6, between subjects) analysis of variance (ANOVA) on mean "choose to" responses yielded a main effect of condition, $F(1, 124)=4.03$, $p = 0.047$, $\eta_p^2 = .1$. Children believed themselves ($M = 0.26$; $SD = .31$) more able to do physically impossible actions than other people ($M = 0.1$; $SD = .54$). There were no other significant differences between groups: age ($p = 0.133$), culture ($p = 0.77$). Importantly, however, one-sample t tests revealed that response patterns were far below chance for both agent conditions, self: $t(64) = -11.01$, $p < 0.001$; other: $t(66) = -23.79$, $p < 0.001$, and 111 of the 132 children answered

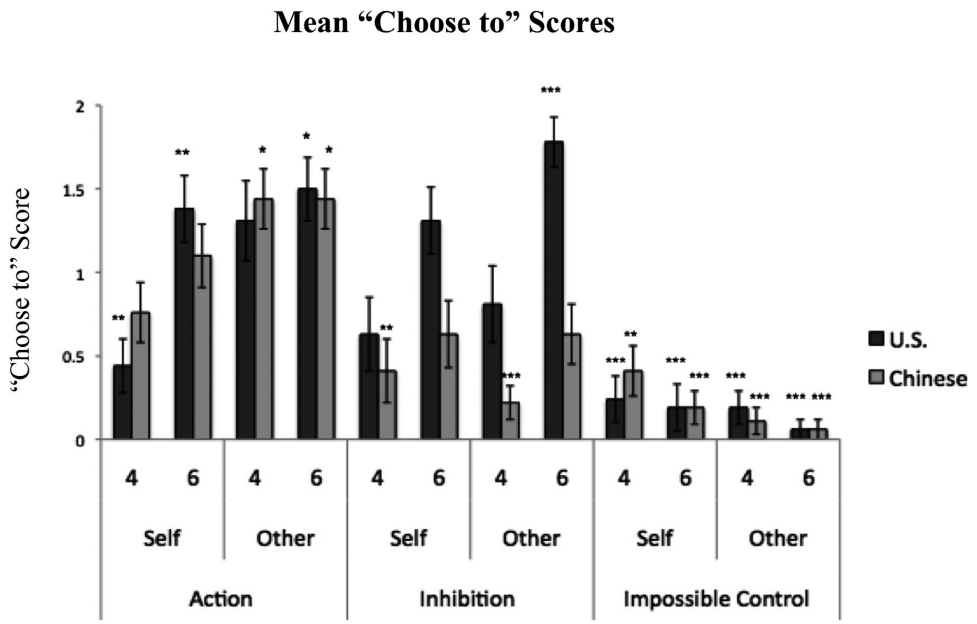

Figure 1. Mean "choose to" scores (0–2) from Chinese children in Experiment 1 and U.S. children from Kushnir et al. (2015). Asterisks indicate a significant difference from chance: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$, using two-tailed t tests.

both control questions correctly. This indicates that children do not believe that people can simply choose to do impossible things, and they understood the structure of the questions. However, the few children who got this wrong were more likely to do so when asked about themselves than about others.

Action Questions

A 2 (Culture: Chinese vs. U.S., between subjects) × 2 (Agent: self vs. other, between subjects) × 2 (Age: 4 vs. 6, between subjects) ANOVA on mean "choose to" responses yielded a main effect of agent condition, $F(1, 125) = 14.39$, $p < 0.001$, $\eta_p^2 = .1$, and a main effect of age, $F(1, 125) = 6.83$, $p = 0.01$, $\eta_p^2 = .05$. There was no cultural difference ($p = 0.88$). Children were more likely to say that other people ($M = 1.43$, $SD = .8$) could act against their desires than that they themselves could ($M = 0.91$, $SD = .84$). Older children ($M = 1.35$, $SD = .77$) provided more "choose to" responses than younger children ($M = 1$, $SD = .87$). Additionally, there was a trending Age × Condition interaction, $F(1, 125) = 3.79$, $p = 0.054$, $\eta_p^2 = .3$, suggesting that 4-year-olds might have a greater "other person bias" than 6-year-olds.

Comparisons to chance using one-sample t tests revealed that the U.S. 4-year-olds in the self condition provided "choose to" answers significantly below chance, $t(15) = -3.58$, $p = 0.003$, and Chinese 4-year-olds answered significantly above chance in the other person condition, $t(17) = 2.41$, $p = 0.028$. The U.S. 6-year-olds provided "choose to" answers significantly more often than chance in the other person condition, $t(17) = 2.27$, $p = 0.015$, as did Chinese 6-year-olds, $t(16) = 2.41$, $p = 0.029$.

Inhibition Questions

A 2 (Culture: Chinese vs. U.S., between subjects) × 2 (Agent: self vs. other, between subjects) × 2 (Age: 4 vs. 6, between subjects) ANOVA on mean "choose to" responses yielded a main effect of culture, $F(1, 125) = 25.34$, $p < 0.001$, $\eta_p^2 = .17$, and age, $F(1, 125) = 18.66$, $p < 0.001$, $\eta_p^2 = .13$. The U.S. children ($M = 1.15$, $SD = .92$) provided more "choose to" answers than Chinese children ($M = 0.46$, $SD = .7$), and 6-year-olds ($M = 1.11$, $SD = .88$) provided more "choose to" answers than 4-year-olds ($M = 0.5$, $SD = .79$). There was no difference between conditions ($p = 0.38$). A trending Age × Culture interaction, $F(1, 125) = 3.897$, $p = 0.051$, $\eta_p^2 = .03$, suggests that cultural differences increased with age.

One-sample t tests revealed that Chinese 4-year-olds provided fewer "choose to" answers than chance in both conditions: self $t(16) = -3.05$, $p = 0.01$ and other $t(17) = -7.71$, $p < 0.001$, whereas

the U.S. 6-year-olds provided "choose to" responses at above-chance levels in the other person condition, $t(17) = 5.1$, $p < 0.001$.

Qualitative Responses

The overall number and percentage of each type of response given is presented in Table 2. A series of Fisher's exact tests were used to test for cultural differences between the U.S. and Chinese children's responses. Chinese data were compared to the coding presented in Kushnir et al. (2015).

Qualitative responses for the "have to" answers are analyzed first. For action questions, there was a significant difference across cultures in the proportion of internal and external explanations (Fisher's exact test, $p = 0.03$). The U.S. children were more likely to give internal reasons to explain why a person could not act against a desire, and Chinese children gave more external reasons. There was no cultural difference when inhibition and action question types were analyzed together ($p = 0.21$) or when inhibition questions were analyzed alone ($p = 1.00$).

Children's qualitative explanations for the "choose to" questions were analyzed next. There was no cultural difference in the proportion of alternate internal versus alternate external explanations overall ($p = 0.25$) or for action ($p = 0.18$) and inhibition ($p = 0.20$) questions individually. The U.S. children provided a total of 96 alternate internal and alternate external explanations, and 22 autonomous explanations. Chinese children provided a total of 99 alternate internal and alternate external explanations, and 4 autonomous explanations. This difference was significant; the U.S. children provided more autonomous explanations than Chinese children (Fisher's exact test, $p < 0.001$). Overall, 14.38% of U.S. children's "choose to" responses were accompanied by an autonomous explanation, whereas only 3.6% of Chinese children's were.

Ten of the 66 U.S. children (15.15%), six 6-year-olds and four 4-year-olds, and three of the 67 Chinese children (4%), two 6-year-olds and one 4-year-old, provided at least one autonomous explanation. More U.S. children provided at least one autonomous explanation than Chinese children, (Fisher's exact test, $p = 0.04$.)

To check that this difference was not a product of coding discrepancies across cultures, the two coders who coded the Chinese data recoded the U.S. data. Fisher's exact tests again confirmed that this difference held across cultures. Using exactly the same coders, U.S. children provided more autonomous explanations than Chinese children overall ($p < 0.001$). In addition, more U.S. children provided at least one autonomous explanation than Chinese children ($p = 0.008$).

Experiment 2

Chinese children provided fewer "choose to" responses than the U.S. children for inhibition questions, but an equivalent number of "choose to" responses for action questions. One possibility is that the language used in the translations made Chinese children less likely to provide "choose to" answers overall. An additional set of control questions was designed to test this. Chinese children were asked if people could choose to perform physically possible actions if they wanted to. The question language mirrored that of Experiment 1.

Method

Participants were fourteen 4-year-olds ($M = 52$ months, range = 47–58 months) and fifteen 6-year-olds ($M = 74$ months, range = 70–82 months).

Table 2
Qualitative Responses Provided by Children in Experiment 1

	Have to			Choose to			
	Internal (%)	External (%)	Other (%)	Alternate internal (%)	Alternate external (%)	Autonomy (%)	Other (%)
Action questions							
Chinese	24 (43.64)	27 (49.09)	4 (7.27)	32 (40.51)	41 (51.9)	0 (0)	6 (7.59)
U.S.	33 (60.00)	14 (25.45)	8 (14.55)	15 (19.48)	34 (44.16)	8 (10.39)	20 (25.97)
Inhibition questions							
Chinese	65 (63.73)	34 (33.33)	3 (2.94)	6 (18.75)	20 (62.5)	4 (12.5)	2 (6.25)
U.S.	27 (48.21)	14 (25.00)	15 (26.79)	19 (25.00)	28 (36.64)	14 (18.42)	15 (19.74)

An additional nine participants were excluded due to unknown birthdates ($n = 5$), incorrect age (experimenter tested 5-year-olds; $n = 3$), experimenter error ($n = 1$), and incomplete audio file ($n = 1$).

All children participated in a warm-up phase that was identical to Experiment 1. Following this, children were asked four physically possible control questions: two questions about themselves and two about Nini. The order of the four questions, as well as whether the particular question was about Nini or the child, was randomized across participants. Questions asked if Nini or the child could *choose to* {sit in a chair/step down a stair to get toys/stand on tiptoes to reach a jacket/walk from the kitchen to the living room} or if they *have to* {stand/stay on the step/leave the jacket there/stay in the kitchen}.

Results

Children received a 1 for each "choose to" response and a 0 for each "have to" response. Children were assigned a score ranging from 0 to 4. A one-sample t test revealed that children's answers ($M = 3.83$, $SD = .38$) were significantly above chance, $t(28) = 25.6$, $p < 0.001$. This held for each age individually: 4-year-olds, $t(13) = 19.14$, $p < 0.001$, and 6-year-olds, $t(14) = 16.84$, $p < 0.001$. Twenty-four of the 29 children answered all four questions correctly. These findings suggest that the cultural difference for the inhibition questions in Experiment 2 was not simply due to the phrasing of the questions. Chinese children were happy to say that an agent could choose to act when those choices did not conflict with the agent's desires.

Discussion

There were many similarities across cultures. Children from the United States and China ascribed similar amounts of choice to people for the action and physically impossible control questions. Both cultural groups at both ages consistently said that people could not choose to do things that are physically impossible, such as float in the air. In both cultures, children also believed that other people were more able to freely choose to act against their desires than they were able to inhibit their desires. For example, both the U.S. and Chinese children were more likely to say that people could choose to eat something they did not like than that they could choose to refrain from eating something they did like. Note that this was true even though the "have to not" question in the action case included a double negative and might have been more confusing than the simpler "have to" in the inhibition case. Across cultures, children also ascribed more choice to other people than to themselves for action questions.

There were similar developmental trends across cultures. Four-year-olds provided fewer "choose to" responses than 6-year-olds. Importantly, Chinese and the U.S. 4-year-olds did attribute some choice to other people in the action cases, and attributed more choice in the action cases than in the physically impossible cases. These findings show that the 4-year-olds' responses were not due to a global tendency to select "have to" answers.

Children's answers for the inhibition questions were different across cultures. Chinese children were less likely than the U.S. children to say that people could choose to inhibit their desires. Chinese and U.S. children provided comparable answers for the action questions, and Chinese children endorsed choice when asked the physically impossible control questions in Experiment 2. This suggests that the cultural difference was not due to an overall tendency for Chinese children to provide fewer "choose to" responses or to the translation of the script.

Most of the children who provided "choose to" responses also provided alternate internal or alternate external explanations. Generally, children answered that people could choose to do otherwise in the sense that if their desires or circumstances were different, they might act differently. Children tended to postulate desires or circumstances that were different from those in the original vignettes. There was only one example, in either cultural group, where children justified a "choose to" answer by contrasting the specified desire with a second order desire or norm. One Chinese child said, "she likes it but there will be none left if she eats it."

These responses do not indicate a fully adult understanding of free will. However, they might reflect an intermediate developmental stage in the progress toward a more adult-like conception of free will. Indeed, in some philosophical accounts, the notion of free will reduces to this sense of "evitability"—that is, the sense that choices could have been different (Dennett, 1984).

Some children provided explanations indicating that they view choice in a more philosophically controversial way, as causally autonomous. This notion of free will was significantly more prevalent

in the United States children's responses (14% vs. 4% of "choose to" answers).

Two aspects of these results weigh against the idea that developments in the understanding of free will are simply the result of increased first-person experiences of self-control. First, children tended to attribute more choice to others than to themselves for the action questions. Second, Chinese children ascribed less choice for inhibition questions yet test better than the U.S. children on inhibitory control tasks (Lan et al., 2011; Sabbagh et al., 2006).

Although these results do not lend direct support for the simple first-person hypothesis, there may also be other explanations for this apparent incongruity between free will beliefs and self-control. First, neither Lan et al. (2011) nor Sabbagh et al. (2006) administered a measure of "hot" inhibitory control, such as a delay of gratification task. Second, we do not know how the actual children in this study would perform on executive functioning tasks. A good next step would be to ask children about their free will beliefs and measure their self-control abilities.

Alternatively, it is possible that broader cultural differences actually influence children's understanding of self-control, which in turn influences their beliefs about free will. Rather than simply having a first-person experience of autonomous will, children's understanding of their own and others' abilities to control their actions might be influenced by cultural conceptions.

The canonical Western account of self-control envisions conflicts between desires and norms that are resolved by an autonomous agent—consider the classic picture of the agent with a devil on one shoulder and an angel on the other whispering opposing instructions. However, people could also view social and normative concerns as direct constraints on actions. Norms may simply override desires without the involvement of agency. Results from Chernyak et al. (2013) suggest that both younger children in the United States and older children in Nepal may conceive of normative constraints in this way. In this study, children said that an agent is not free to simply act against a norm. For example, children said that it would not be possible to choose to hurt another child's feelings or to choose to wear pajamas to school. If children in China understand self-control in this way, that is, as a direct application of social or normative constraints, rather than as the influence of norms on an autonomous agent, this might explain the apparent contradiction between their executive control abilities and their free will intuitions.

Inhibition questions were generally more difficult than action questions. This difficulty actually goes against at least Western adult intuitions—it would seem on the face of it easier to resist a tasty cookie than to actively eat an unpleasant one. This somewhat puzzling data pattern suggests that there might be some difference between inhibition and action that makes it more difficult for young children to imagine choice in situations of inhibition. There are several reasons why this could be the case. For example, the executive control literature suggests that inhibition may be particularly difficult for young children, which might suggest that there is indeed some contribution of first-person experience to these responses. Cases of inhibition might also be more salient and unambiguous. There is also an asymmetry in whether the situation involves a desirable object, in the inhibition case, or an undesirable one, in the action case. This remains a question for further study.

It appears that children do not simply reflect on their own experience of self-control to create a concept of free will. On the other hand it also appears that they do not simply internalize the conceptions of the culture around them. The developmental pattern where physical and epistemic constraints precede desire constraints, understanding others precedes understanding the self, and understanding action precedes understanding inhibition is common across cultures and does not seem to simply reflect the beliefs of either the U.S. or Chinese adults.

However, it is not clear how adults in China and the U.S. would answer these questions. It is possible that adults within both cultures hold similar beliefs. It is also possible that cultural differences continue on into adulthood. Several studies have found cultural differences in adults' beliefs about social causation and choice (Markus & Kitayama, 1991; Miller, Das, & Chakravarthy, 2011; Morris & Peng, 1994; Savani, Markus, Naidu, Kumar, & Berlia, 2010).

These results underscore the complexity of everyday free will beliefs. Previously, philosophers and psychologists have debated whether the strongest intuitions of free will are really widespread among ordinary people, and if they are ultimately accurate. Studying the development of free will intuitions across cultures suggests that ideas about free will can vary in important and illuminating ways. Children develop an understanding of physical, epistemic, social, and motivational constraints on free will at different times, and this developmental progression varies in different cultures. Similarly, we

saw differences in the ways that children treat cases of inhibition versus cases of action, and cases that involve the self versus cases that involve others. All this suggests that coming to an understanding of free will is a complicated and protracted process, which involves combining the experience of the self and others, as well as incorporating cultural conceptions. Our adult understanding of free will is not simply the result of either first-person experience or cultural internalization.

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