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The role of consensus and culture in children's imitation of inefficient actions

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ABSTRACT

A significant body of work has demonstrated children's imitative abilities when learning novel actions. Although some research has examined the role of cultural background in children's imitation of inefficient actions, to our knowledge no research has explored how culture and conformity interact when engaging in imitation. In Study 1, 87 Caucasian American and Chinese American preschoolers were presented with either one model or three models performing an inefficient action. Whereas there were no cultural differences in imitation in the *Single Model* condition, Chinese Americans were significantly more likely to copy the model's preference for an inefficient tool in the *Consensus* condition. Children's tool choice was associated with their justification for their choice as well as their memory for the model's action. Study 2 explored the impact of immigration status on the cultural differences in children's tool choice by including 16 first-generation Caucasian American children. When comparing the findings with the rates from Study 1, both groups of Caucasian American preschoolers imitated at rates significantly lower than the Chinese American preschoolers. We suggest that the tool choices of Caucasian American children relate to a tendency to engage in a perceptually driven mode of learning, whereas the choices of the Chinese American children reflect a greater likelihood to use a socially driven mode.

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Introduction

Imitation is a powerful learning mechanism used by young children to acquire information. Through imitation and emulation, both human children and some species of non-human animals can learn cultural information, such as how to "appropriately" use particular tools (e.g., Harris, 2012; Horner & Whiten, 2005; Whiten, McGuigan, Marshall-Pescini, & Hopper, 2009), as well as particular social conventions (Kenward, Karlsson, & Persson, 2011; Over & Carpenter, 2012; van de Waal, Borgeaud, & Whiten, 2013; Whiten, Horner, & de Waal, 2005). Indeed, humans are so prone to imitate that they sometimes imitate actions not required to achieve the particular goal (i.e., "over-imitation"; Horner & Whiten, 2005; Kenward, 2012; Keupp, Behne, & Rakoczy, 2013; Lyons, Damrosch, Lin, Macris, & Keil, 2007; Lyons, Young, & Keil, 2007; Nielsen, Mushin, Tomaselli, & Whiten, 2014; Nielsen & Tomaselli, 2010). Similarly, in some situations children imitate less efficient actions—despite the fact that these actions lead to sacrificing the intended goal (DiYanni & Kelemen, 2008; DiYanni, Nini, & Rheel, 2011; DiYanni, Nini, Rheel, & Livelli, 2012). Taken together, this research suggests that children view a demonstrated action to be socially prescribed and normative—even if it is irrelevant from a strictly pragmatic point of view (Kenward, 2012; Kenward et al., 2011; Keupp et al., 2013).

Despite a propensity to imitate demonstrated actions, children can be relatively selective in the actions they imitate. For example, Nielsen and Blank (2011) presented 4- and 5-year-olds with two adult models. Each model opened a puzzle box, but one model included irrelevant actions. When children were invited to open the puzzle box in the presence of the more efficient model, children imitated only the causally relevant actions. In contrast, children imitated the unnecessary actions in the presence of the less efficient model. Similarly, DiYanni and colleagues (2011) found that children were more likely to imitate a model's inefficient action if they performed the action in the model's presence. Thus, children's imitative abilities may be influenced by social and situational cues.

Here, we explored one important social cue young children use when determining what to learn from individuals—group consensus. Classic social psychological research indicates that adults concede to a majority opinion on approximately 33% of trials—even if the opinion is inaccurate (e.g., Asch, 1956). More recent studies have found that, like adults, toddlers and preschoolers pay particular attention to consensus information (e.g., Chen, Corriveau, & Harris, 2013; Claudière & Whiten, 2012; Corriveau, Fusaro, & Harris, 2009; Fusaro & Harris, 2008; Haun, Rekers, & Tomasello, 2012; Haun, Van Leeuwen, & Edelson, 2013; Hermann, Legare, Harris, & Whitehouse, 2013). Indeed, even when preschoolers are presented with a clearly incorrect consensus opinion, they display rates of deference similar to adults (e.g., Corriveau & Harris, 2010; Haun & Tomasello, 2011; see also Costanzo & Shaw, 1966; Walker & Andrade, 1996).

Across two studies, we examined whether children's attention to consensus would affect how they learn about tools. Specifically, we asked whether children would be more willing to imitate a non-optimal tool preference if it was demonstrated by a consensus than if it was demonstrated by a single model. As mentioned above, some work on children's perceptual decision making indicates that children are somewhat willing to defer to the judgment of the consensus (e.g., Corriveau & Harris, 2010; Corriveau, Kim, Song, & Harris, 2013; Haun & Tomasello, 2011; Hermann et al., 2013). In the current set of studies, we asked whether children are deferential when making decisions about unexpected tool functions, a task that involves both visual evaluation and physical action for goal completion.

We presented children with either (a) a single model who chose the same inefficient tool for a task over a more efficient alternative three times or (b) three models who each opted for the same inefficient tool once. We predicted that children would be more willing to engage in faithful imitation of the model's preference for the inefficient tool when they had watched a consensus choose the tool than when they had watched a single model.

Our second goal was to explore cultural differences in children's faithful imitation. In Study 1, we tested two cultural groups: first-generation Chinese American preschoolers (children were born in the United States but parents were not) and at least second-generation Caucasian American preschoolers (children and parents were born in the United States). In Study 2, we confirmed that the effects found in Study 1 were based on cultural differences—and not on social group membership—by testing a group of first-generation Caucasian American preschoolers. We focused on these groups because

previous research with adults has indicated that individuals from collectivistic cultures (such as Asian cultures) engage in higher rates of imitation than those from individualistic cultures (such as the United States) (Chu, 1979; Frager, 1970; Huang & Harris, 1973; Meade, 1973; Williams & Sogon, 1984; for a review, see Bond & Smith, 1996). Moreover, recent developmental work with preschoolers echoes this finding; the rate of deference to an incorrect consensus among Asian American preschoolers is nearly double that among Caucasian American preschoolers (Corriveau & Harris, 2010; Corriveau et al., 2013).

This propensity for Asian children to privilege information provided by a social other is consistent with a large body of research highlighting differences between Western and East Asian systems of thought (Nisbett, Peng, Choi, & Norenzayan, 2001). It is likely that early parental socialization is the mechanism by which young children are exposed to such differences. Indeed, East Asian parents value conformity, power, and the encouragement of modesty more highly than Western parents (Suizzo & Cheng, 2007; Wu et al., 2002; but see also Xiao, 1999). This is in part because the act of non-conforming is seen as "deviant" in an East Asian cultural context, whereas it is "unique" in a Western cultural context (Kim & Markus, 1999). Thus, early social influences may bias children's imitative tendencies in novel social learning situations. On this basis, we might anticipate that Chinese American preschoolers would engage in higher rates of faithful imitation of a model's preference than Caucasian American preschoolers, whether presented with a single model or a consensus.

An alternative possibility comes from a closer examination of previous research. Specifically, the cultural differences found in previous studies with preschoolers specifically focused on differences in deference to a consensus (Corriveau & Harris, 2010; Corriveau et al., 2013). Given that these differences in deference level were not related to any differences in perception, Corriveau and Harris (2010) argued for two different modes of learning—a socially driven mode and a perceptually driven mode (see also Over & Carpenter, 2012, 2013; Yu & Kushnir, 2014)—and suggested that Asian Americans rely primarily on the former, whereas Caucasian American children rely primarily on the latter. Arguably, being faced with a consensus that prefers a perceptually and functionally inferior object would activate different modes in the two different cultural groups. Based on this premise, we might expect Chinese American preschoolers to engage in more faithful imitation of the model's preferred method than Caucasian American children only when the social cues are particularly strong, that is, only when presented with a consensus. In contrast, we would not anticipate a difference between the two cultural groups when presented with a single model.

The current set of studies combines and expands on earlier methods to distinguish between the two options described above. Caucasian American and Chinese American children were presented with a video of either one model or a group of three models who rejected an efficient tool for a task in favor of an inefficient tool. Children were invited to perform the same task themselves. We asked whether Chinese American children's selection of the inefficient tool would occur at higher rates than in Caucasian American children. In addition, we asked whether Chinese American children would be more prone to imitate the model's preference specifically in the *Consensus* condition.

Study 1

Method

Participants

A total of 87 3- to 5-year-old children participated (M_{age} = 56.9 months, *SD* = 9.0, range = 38–74, 37 girls). Of this sample, 43 children were Caucasian American (M_{age} = 55.4 months, *SD* = 7.5, range = 40–69, 18 girls) and 44 were first-generation Chinese American[2] (M_{age} = 59.8 months, *SD* = 8.3, range = 39–74, 19 girls). Children were recruited from local preschools in the U.S. Northeast. They were tested in quiet rooms in their schools apart from other children. All participants received a small token for participation (e.g., stickers). Ethnicity information was collected via parental report. Although

[2] All children in this group were born in the United States, and both parents were born in China.

information on socioeconomic status was not collected, all of the preschools served predominantly middle- and upper middle-class populations.

Materials

Four Caucasian American female college-aged actors,[3] two novel tools, and three sandwich cookies were used as stimuli.

Fig. 1 depicts both tools. The Functionally Affordant tool was composed of a firm handle vertically attached to a wooden circular base with a flat bottom, making it efficient for crushing cookies. The Non-Affordant tool was composed of a metal U-shaped handle and fuzzy pom-poms, making it inefficient for crushing cookies (note that cookies could be crushed by exerting a great deal of force or by turning the tool upside-down and using the handle). Previous research using these tools indicates that 89% of 3- and 4-year-olds choose to use the Functionally Affordant tool over the Non-Affordant tool to crush a cookie when both tools are modeled with equal intention (DiYanni & Kelemen, 2008).

Procedure

Baseline exposure period. Children were first exposed to the tools and a cookie in a baseline exposure period. The experimenter began by saying, "I've got some neat things I brought from my school. Have you ever seen these before? Do you know what we do with them?" No child attempted to spontaneously crush the cookie with either tool or to make any contact with it prior to the demonstration. Nor did any child spontaneously suggest that the tools could be used for crushing cookies (the few suggested functions focused on painting, cleaning, and playing).

After being introduced to the tools, children watched one of two task modeling videos: a *Single Model* video in which one Caucasian American model demonstrated the functions of the two tools or a *Consensus* video in which the functions were demonstrated by three Caucasian American models. Videos were shown on a 15-inch laptop screen. Next, all children were given a tool choice trial, where they were invited to use one of the two tools to crush a cookie. Finally, a memory check question was asked to ensure that children remembered the video.

Task modeling. To introduce the task, the experimenter said, "Okay, now we're going to watch a movie. Make sure you pay attention because I'm going to ask you some questions about it at the end." Approximately half of the children watched the *Single Model* video (22 Caucasian American children: M_{age} = 55 months, 9 girls; 22 Chinese American children: M_{age} = 59 months, 8 girls), $t(42) = 1.63$, *ns*. The remaining half watched the *Consensus* video (21 Caucasian American children: M_{age} = 55 months, 11 girls; 22 Chinese American children: M_{age} = 59 months, 11 girls), $t(41) = 1.72$, *ns*.

In each condition, the video began with the model(s) facing forward and remaining neutral in affect. An off-screen narrator introduced the task, saying, "Hi. I need your help crushing these cookies so I can put them on top of a pie that I am baking tonight. You can use one of the objects in front of you. Try them both, and tell me which one you would need to crush your cookie(s)."

In the *Consensus* video, all three models had a cookie in front of them. When it was a model's turn, the other models watched as she picked up one tool in each hand, considered each visually, and first tried the Functionally Affordant tool (hitting the cookie two times with it) and then the Non-Affordant tool (again hitting the cookie two times with it). The other two models retained neutral expressions while observing. After interacting with both tools, she held up the Non-Affordant tool and said, "This is the one I would need." Thus, children watched each model interacting equally with both tools prior to making her decision to use the Non-Affordant tool.

The *Single Model* video was similar to the *Consensus* video. One model had three cookies in front of her. As in the *Consensus* video, she began by trying the Functionally Affordant tool. For the task to be pragmatically appropriate while paralleling the amount of usage that the Functionally Affordant tool had in the *Consensus* video, we constrained the use of the Functionally Affordant tool to the first cookie only. The single model hit the first cookie six times with the Functionally Affordant tool. She then

[3] We did not suspect that using Caucasian American models would have any significant impact on the child participants of either race. Recent research indicates that Asian and Caucasian participants display similar rates of deference for the information provided by the consensus when the consensus was made up of racial in-group or out-group members (Chen et al., 2013).

Fig. 1. Tools used for the task of crushing cookies. The Functionally Affordant tool is on the left, and the Non-Affordant tool is on the right.

picked up the Non-Affordant tool, tried it twice with the first cookie, and declared, "This is the one I would need." She then hit the second and third cookies each twice with the Non-Affordant tool, nodding as she hit the second cookie and reiterating, "This is the one I would need," as she made contact with the third cookie. Thus, as in the *Consensus* condition, children watched the model interact equally with both tools across three different cookies.

In both videos, the total time the model(s) interacted with the tools was 15 s, and each tool was used six times (see also Haun et al., 2012, for a similar methodology). In addition, in both videos the actual outcome of the tool use was somewhat ambiguous. The hits from the Functionally Affordant tool resulted in a softening of the cookie, and when the model(s) made contact with the Non-Affordant tool some crumbs were visible. Therefore, the demonstration resulted in the impression that the cookie(s) had been crushed by the model(s), but it was somewhat ambiguous as to which of the tools actually resulted in the cookie breaking. This design allowed us to determine whether children's decisions were influenced by the model's deliberate choices rather than the physical consequences of each tool's use.

Tool choice trial. Immediately following the video, the experimenter brought out both tools and a cookie. The experimenter asked, "If you were going to crush a cookie for a pie, which one would you need?" The word "need" (as opposed to "want" or "think you should use") was chosen to parallel previous research using a similar paradigm (e.g., DiYanni & Kelemen, 2008; DiYanni et al., 2011, 2012). We believed that the word "need" was the term that could be interpreted most loosely, that is, either as the tool that was most functionally efficient *or* as the tool that was most socially accepted. Both tools were then placed in front of each child, and the child was invited to use one to crush the cookie. The tool choice was recorded as the first tool used to make contact with the cookie. Afterward, the child was asked why he or she had chosen that particular tool.

Memory check. Finally, following the tool choice trial, children were presented with a memory check. The experimenter displayed a still frame of the model(s), held up both tools, and asked, "Can you tell me which one she said she would need to crush the cookie?" Note that children needed to answer only one question for the *Single Model* condition; the same question was repeated three times for the *Consensus* condition.

Results

Preliminary analyses of gender revealed no differences in overall imitation rates or by cultural background or condition (Fisher exact tests, all $ps > .05$). All remaining analyses, therefore, consider children of both genders together.

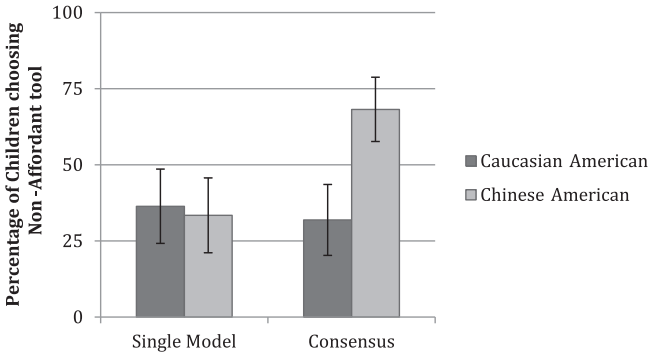

Fig. 2. Percentages (and standard errors) of children imitating by choosing the Non-Affordant tool by condition for each cultural background.

Tool choice

The percentage of children imitating the model's preference for the Non-Affordant tool in each condition is depicted in Fig. 2. Inspection of this figure reveals no noteworthy differences in the percentages of children who chose to imitate the use of the Non-Affordant tool among Caucasian American children in the *Single Model* condition (36.4%), Caucasian American children in the *Consensus* condition (33.3%), and Chinese American children in the *Single Model* condition (31.8%). In contrast, the percentage of Chinese American children who imitated the model's choice in the *Consensus* condition (68.2%) was significantly higher than the percentage of Chinese American children who did so in the *Single Model* condition (Fisher exact test, $p = .034$) and the number of Caucasian American children who did so in the *Consensus* condition (Fisher exact test, $p = .034$). A chi-square test confirmed that Asian American children performed significantly differently in the *Consensus* condition than children in all three other conditions, $\chi^2(1, N = 87) = 8.02$, $p = .05$, $\phi = .30$.

To explore age-related differences in children's imitation of the model's inefficient action by culture, we ran two sets of binomial logistic regressions with tool choice as the dependent variable and cultural group (Chinese American or Caucasian American) and age in months as predictors. The model was not significant for the *Single Model* condition (-2 log likelihood [-2LL] = 52.07, $\chi^2 = 0.988$, *ns*). For the *Consensus* condition, the best fit model (-2LL = 54.26, $\chi^2 = 5.33$, $p = .02$) included the cultural group predictor only ($\beta = 1.46$, $SE = 0.65$, Wald $\chi^2 = 4.99$, $p = .03$). The odds of imitating the tool preferred by the group are 4.30 more likely for Chinese American children than for Caucasian American children. Across both conditions, age in months was not a significant predictor of tool selection.

Memory check

Children received a point if they correctly remembered the tool choice(s) of the model(s). Children in both conditions performed above 50% chance in remembering the tool that the model had chosen: *Single Model* ($M = .73$, $SD = .45$), $t(43) = 3.35$, $p = .002$, $d = 0.51$; *Consensus* ($M = .74$, $SD = .44$), $t(42) = 3.63$, $p = .01$, $d = 0.55$. Children's memory performance did not vary by condition, $\chi^2(1, N = 87) = 0.86$, *ns.* Similarly, children in both cultural groups performed above 50% chance: Caucasian American ($M = .70$, $SD = .46$), $t(42) = 2.78$, $p = .008$, $d = 0.43$; Chinese American ($M = .77$, $SD = .42$), $t(43) = 4.27$, $p = .000$, $d = 0.63$. Children's memory performance did not vary by cultural group, $\chi^2(1, N = 87) = 0.63$, *ns.*

We next asked whether children's ability to remember the model's tool choice was related to their own tool choice. The percentages of children passing the memory check by tool choice are shown in Fig. 3. Most children who chose the Non-Affordant tool accurately remembered the model's choice. However, children who chose the Functionally Affordant tool were approximately at chance in remembering the model's choice. Further analysis confirmed a significant difference in memory of the model's tool choice between children choosing the Functionally Affordant tool and those choosing the Non-Affordant tool, McNemar $\chi^2(1, N = 87) = 11.12$, $p < .001$, $\phi = .38$.

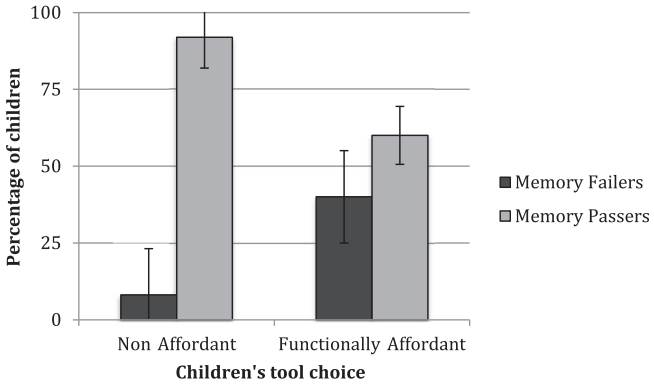

Fig. 3. Percentages (and standard errors) of children who correctly remembered the model's tool choice by children's own tool selection.

Table 1
Percentage of children offering each type of justification as a function of children's tool choice.

Explanation	Non-Affordant tool choice ($N = 37$)	Functionally Affordant tool choice ($N = 50$)
Model choice	16	0
Tool properties	16	46
Uninformative	68	54

Finally, we assessed children's explanations for their tool choice. Explanations were coded by two different raters into one of three categories: referring to the model (*model choice;* e.g., "she chose it"), referring to the functional or physical properties of the tool (*tool properties;* e.g., "it is better for crushing"), or *uninformative* (e.g., "I don't know,"). Interrater reliability was high ($\kappa = .94$, $p = .000$). Children's explanations are summarized in Table 1. To explore the relationship between children's tool choice and their subsequent explanation, we excluded uninformative explanations. Inspection of Table 1 indicates that when considering only the informative categories ($N = 37$), children who chose the Functionally Affordant tool always used tool properties explanations. In contrast, children who chose the Non-Affordant tool were equally likely to provide explanations from either the tool properties or model choice category, McNemar $\chi^2(1, N = 37) = 10.45$, $p = .001$, $\phi = .63$.

Discussion

Taken together, these results support two main conclusions. First, children's tool choice was related to both the number of models and children's own cultural group. Second, children's tool choice was related to both their subsequent memory of the model's tool choice and their justification of their own tool choice. We consider and offer a rationale for each of these conclusions in turn.

First, Caucasian American children's rates of imitating the model's tool preference were similar in both the *Single Model* and *Consensus* conditions. With the exception of Hermann and colleagues (2013), previous research on children's learning from a consensus has either provided children with a contrast between an action or a judgment by a consensus and a different action by a single model (e.g., Chen et al., 2013; Corriveau et al., 2009; Haun et al., 2012) or asked children to learn from a consensus only (e.g., Claudière & Whiten, 2012; Corriveau & Harris, 2010; Haun & Tomasello, 2011). This is the first study to experimentally investigate whether children's deference to a consensus was greater than their deference to a single model when evaluating inefficient actions. The results from the Caucasian American children suggest that learning from both sources is equivalent during the preschool years. The somewhat surprisingly low rates of copying the model's preferred method, even in the face of consensus, likely result from the non-optimal nature of the model's actions. Indeed,

previous research on children's imitation of inefficient actions finds extremely low rates of copying among preschoolers (DiYanni & Kelemen, 2008).

Note that for pragmatic reasons, the procedure under which children viewed the two tools used in the *Single Model* and *Consensus* conditions varied slightly. Specifically, in the *Consensus* condition, each informant acted on one cookie with both tools (both tools were demonstrated six times in total). However, in the *Single Model* condition, because the model stated her preference for using the Non-Affordant tool after the first cookie (to be consistent with the *Consensus* condition), we believed that it was pragmatically inappropriate for her to then go back to testing the Functionally Affordant tool on the subsequent cookies. If anything, such a change might have biased young children's preferences toward using the Non-Affordant tool more so in the *Single Model* condition. This was not the case; if anything, the data from the Chinese American children suggest the exact opposite preference.

Chinese American children showed greater rates of imitating the model's preference for the inefficient tool in the *Consensus* condition than in the *Single Model* condition. Note that these data do not suggest that Chinese American children are more willing than their Caucasian American counterparts to imitate inefficient actions *in general,* which was the first possibility explored in the Introduction. We found no difference in Caucasian American and Chinese American children's tool choice selection in the *Single Model* condition. Instead, this willingness of Chinese American children to learn from a consensus—even when their choices are non-optimal—confirms the second hypothesis and is consistent with research demonstrating that Asian American children and adults seem to be especially inclined to conform to the majority (Frager, 1970; Huang & Harris, 1973; Meade, 1973; Williams & Sogon, 1984). It is also consistent with the possibility that Chinese American children pay special attention to social cues (Corriveau & Harris, 2010).

At first glance, our findings that the Chinese American children showed such high rates of deference to a consensus of Caucasian American models may seem somewhat surprising in light of research suggesting that children show a preference for imitation of, affiliation with, and applying social norms when interacting with one's in-group over one's out-group (e.g., Buttelmann, Zmyj, Daum, & Carpenter, 2013; Over & Carpenter, 2012, 2013; Schmidt, Rakoczy, & Tomasello, 2012). Our findings are consistent with other recent research with the two specific cultural groups included here that has found similar rates of deference to a consensus, regardless of whether the consensus was made up of racial in-group or out-group members (but note that this preference is somewhat fragile; Chen et al., 2013). We somewhat addressed this apparent contradiction in Study 2 by exploring second-generation Caucasian American children's deference to the consensus. However, future studies could vary the cultural group of the model and assess the impact on children's rates of deference to the consensus.

Regardless of cultural group, children's tool choice was related to their memory of the model's tool choice and to their explanation of their actions. Children who chose the Non-Affordant tool were more likely to correctly remember the model's non-optimal tool choice as well as to justify their own choice by appealing to the model. In contrast, children who chose the Functionally Affordant tool misreported the model's selection roughly half of the time and always justified their actions by appealing to tool properties. These data are consistent with social psychological theory highlighting the avoidance of cognitive dissonance when explaining prior actions (Aronson, 1969; Cooper & Fazio, 1984; Festinger, 1957). Indeed, all children who provided an explanation based on the model's actions were also accurate in their memory for her actions and chose the Non-Affordant tool. In contrast, no children who chose the Functionally Affordant tool cited the model as their reason. Note that this finding should be interpreted with caution given that the majority of children did not offer any explanation for their tool choice. Taken together, these data suggest that young children are developing in their ability to provide coherent theory to justify their tool choice.[4]

[4] An alternative explanation is that children who did not remember the model's actions defaulted to using the tool best-suited for the task (i.e., the Functionally Affordant tool). We advocate for the cognitive dissonance approach because the memory check question was asked *after* children made their tool choice. In addition, given the lack of a significant age difference between those who chose the Functionally Affordant tool and those who copied the model's choice of the Non-Affordant tool, we believe that the majority of children's inaccurate reports resulted primarily from the desire to align the model's actions with their own rather than from truly forgetting what the model did.

Study 2 was designed to address one additional interpretation of these data. Recall that the groups differed on both culture (Chinese American or Caucasian American) and amount of time their families had spent in the United States (first generation or second generation). It is plausible that immigration status—and not cultural group—was the reason for the increased rates of imitation in the Consensus condition. Study 2 explored this hypothesis by including an additional group of first-generation Caucasian American children in the *Consensus* condition. We anticipated that this group would imitate at rates similar to their second-generation counterparts, thereby suggesting that the differences in imitation found in Study 1 were not based on immigration status, but rather were based on cultural background.

Study 2

Method

Participants

A total of 16 first-generation Caucasian American preschoolers participated (M_{age} = 50.9 months, *SD* = 8.6, range = 38–71, 6 girls). As in Study 1, children were recruited from local preschools in the U.S. Northeast. They were tested in quiet rooms in their schools apart from other children. All participants received a small token for participation (e.g., stickers). Ethnicity information was collected via parental report. Although information on socioeconomic status was not collected, all of the preschools served predominantly middle- and upper middle-class populations.

Materials and procedure

The procedure was identical to the *Consensus* condition from Study 1. Children first watched a movie in which three actors stated that they would prefer to use a Non-Affordant tool over a Functionally Affordant tool to crush cookies.

Results and discussion

Of the 16 first-generation Caucasian American preschoolers, only 3 (19%) chose to use the Non-Affordant tool. When comparing these data with the results found in Study 1, the first-generation Caucasian American children imitated at a rate not significantly different from the second-generation Caucasian American children, $\chi^2(1, N = 37) = 0.32$, *ns,* but at a significantly lower rate than the first-generation Chinese American children, $\chi^2(1, N = 38) = 9.07$, $p = .002$, $\phi = .49$.

We next explored children's memory for the tool choices of the model(s). As in Study 1, children performed above 50% chance in remembering the tool that the model had chosen ($M = .81$, $SD = .40$), $t(15) = 3.10$, $p = .007$, $d = 1.60$. Unlike in Study 1, children's own tool choice was not related to their ability to remember the model's tool choice, McNemar $\chi^2(1, N = 16) = 1.00$, *ns.* However, this finding should be interpreted with caution given the small samples in the current study.

Finally, we explored children's explanations for their tool choice. As in Study 1, the majority of the children (10 of 16) provided uninformative explanations. The remaining 6 children appealed to the properties of the tool. Of these 6 children, 5 (83%) chose the Functionally Affordant tool.

Taken together, the results from Study 2 indicate that when presented with a consensus of three models who intentionally selected an inefficient tool for a task, first-generation Caucasian American children rarely followed the model's preferred tool choice. Instead, the overwhelming majority of the children in Study 2 preferred to use the more efficient option. These data are consistent with the data from the second-generation Caucasian American children presented in Study 1 and help to support our interpretation that children's deference to unexpected consensus information varies by their cultural background—and not by immigration status.

Moreover, the first-generation Caucasian American sample was significantly less likely than their second-generation Chinese American peers to imitate the consensus preferred tool choice. We believe that these results confirm our argument that cultural background affects how one learns in the face of a consensus. Chinese American children were more likely to be influenced by the consensus than

Caucasian American children, regardless of how long the Caucasian American children's parents had been in the country.

General discussion

The results from Studies 1 and 2 highlight a clear difference in deference to the consensus between Caucasian American and Chinese American children. These findings provide additional evidence for a cultural difference in modes of learning (e.g., Chang et al., 2011; Corriveau & Harris, 2010; Harris & Corriveau, 2013; Marsh, Ropar, & Hamilton, 2014; Over & Carpenter, 2012, 2013; Yu & Kushnir, 2014). Whereas children's choice of the Functionally Affordant tool seems to offer evidence for a reliance on a perceptually driven mode of learning, children's choice of the Non-Affordant tool exemplifies a socially driven mode. We propose that Chinese American children are more likely to use the socially driven mode in novel, consensus-based learning situations than Caucasian American children. Note that Corriveau and Harris (2010) referred to this socially driven mode as "respectful deference"—deference toward the group but not necessarily a permanent reappraisal of the available perceptual information. In line with these data, Chinese American children in our studies showed more reliance on the socially driven mode only when the group was more salient, as in the *Consensus* condition. This differential reliance on the socially driven mode is echoed in adult studies exploring Western and East Asian systems of thought (Nisbett et al., 2001).

Because our studies found a stable cultural difference in children's selective imitation across the preschool years, we consider developmental origins of such a difference in learning stances. One possibility is different socialization practices in parenting. Previous research indicates that East Asian mothers score lower than Western mothers on measures of parental warmth, acceptance, and democratic participation but score higher on measures of physical coercion (Wu et al., 2002). Similarly, other research indicates that East Asian mothers attach greater importance to conformity and power than American mothers (Suizzo & Cheng, 2007). It is likely that parenting factors, such as the way in which parents teach their children, affect the ways in which children then learn from others. Further research should explore whether such teaching strategies are related to the impact of social cues such as consensus on children's learning.

Nevertheless, further research is needed to explore exactly how children viewed the actions of the models. That is, did children who chose the Non-Affordant tool actually believe that it was the correct tool for crushing cookies—and would they generalize using this tool in a novel learning situation? Children from a very young age are rational imitators, assuming that actions occur in order to achieve goals by the most efficient means available (Gergely, Bekkering, & Kiraly, 2002; Gergely & Csibra, 2003). However, children are also likely to imitate unnecessary actions when a demonstrator is knowledgeable and displays pedagogical cues (Buchsbaum, Gopnik, Griffiths, & Shafto, 2011; see also Kenward, 2012; Kenward et al., 2011; Nielsen, Simcock, & Jenkins, 2008). Our findings do not resolve the question of whether children who imitated the model's inefficient choice did so because they somehow believed that the model was making a rational choice or because the pedagogical cues were strong.

In conclusion, when given the opportunity to imitate an inefficient action from either a single model or a consensus, the role of the consensus was powerful, particularly for those from a Chinese cultural background. We interpret this influence in line with two modes of responding: a reliance on a perceptually driven mode versus a socially driven mode. Chinese American children were more swayed by the consensus than Caucasian American children, highlighting the important role of culture in acquiring knowledge. Irrespective of cultural group, deference to the model's choice was associated with better memory for the model's action and justifications citing the model. We suggest that early experiences may influence children's preference between these two modes of learning.

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References

Aronson, E. (1969). The theory of cognitive dissonance: A current perspective. In L. Berkowitz (Ed.). *Advances in experimental social psychology* (4, pp. 1–34). New York: Academic Press.

Asch, S. E. (1956). Studies of independence and conformity: A minority of one against a unanimous majority. *Psychological Monographs: General and Applied, 70*, 1–70.

Bond, R., & Smith, P. B. (1996). Culture and conformity: A meta-analysis of studies using Asch's line judgment task. *Psychological Bulletin, 119*, 111–137.

Buchsbaum, D., Gopnik, A., Griffiths, T. L., & Shafto, P. (2011). Children's imitation of causal action sequences is influenced by statistical and pedagogical evidence. *Cognition, 120*, 331–340.

Buttelmann, D., Zmyj, N., Daum, M., & Carpenter, M. (2013). Selective imitation of in-group over out-group members in 14-month-old infants. *Child Development, 84*, 422–428.

Chang, L., Mak, M. C. K., Li, T., Wu, B. P., Chen, B. B., & Lu, H. J. (2011). Cultural adaptations to environmental variability: An evolutionary account of East-West differences. *Educational Psychology Review, 23*, 99–129.

Chen, E. E., Corriveau, K. H., & Harris, P. L. (2013). Children trust a consensus composed of outgroup members—but do not retain it. *Child Development, 84*, 269–282.

Chu, L. (1979). The sensitivity of Chinese and American children to social influences. *Journal of Social Psychology, 109*, 175–186.

Claudière, N., & Whiten, A. (2012). Integrating the study of conformity and culture in humans and nonhuman animals. *Psychological Bulletin, 138*, 126–145.

Cooper, J., & Fazio, R. (1984). A new look at dissonance theory. In L. Berkowitz (Ed.). *Advances in experimental social psychology* (17, pp. 229–265). New York: Academic Press.

Corriveau, K. H., Fusaro, M., & Harris, P. L. (2009). Going with the flow: Preschoolers prefer nondissenters as informants. *Psychological Science, 20*, 72–377.

Corriveau, K. H., & Harris, P. L. (2010). Preschoolers (sometimes) defer to the majority in making simple perceptual judgments. *Developmental Psychology, 46*, 437–445.

Corriveau, K. H., Kim, E., Song, G., & Harris, P. L. (2013). Young children's deference to a majority varies by culture. *Journal of Cognition and Culture, 13*, 367–381.

Costanzo, P. R., & Shaw, M. E. (1966). Conformity as a function of age level. *Child Development, 37*, 967–975.

DiYanni, C., & Kelemen, D. (2008). Using a bad tool with good intention: Young children's imitation of adults' questionable choices. *Journal of Experimental Child Psychology, 101*, 241–261.

DiYanni, C., Nini, D., & Rheel, W. (2011). Looking good versus doing good: Which factors take precedence when children learn about new tools? *Journal of Experimental Child Psychology, 110*, 575–591.

DiYanni, C., Nini, D., Rheel, W., & Livelli, A. (2012). "I won't trust you if I think you're trying to deceive me": Relationships between selective trust, theory of mind, and imitation in early childhood. *Journal of Cognition and Development, 13*, 354–371.

Festinger, L. (1957). *A theory of cognitive dissonance*. Palo Alto, CA: Stanford University Press.

Frager, R. (1970). Conformity and anticonformity in Japan. *Journal of Personality and Social Psychology, 15*, 203–210.

Fusaro, M., & Harris, P. L. (2008). Children assess informant reliability using bystanders' non-verbal cues. *Developmental Science, 11*, 771–777.

Gergely, G., Bekkering, H., & Kiraly, I. (2002). Rational imitation in preverbal infants. *Nature, 415*, 755.

Gergely, G., & Csibra, G. (2003). Teleological reasoning in infancy: The naive theory of rational action. *Trends in Cognitive Sciences, 7*, 287–292.

Harris, P. L. (2012). *Trusting what you're told: How children learn from others*. Cambridge, MA: Belknap Press/Harvard University Press.

Harris, P. L., & Corriveau, K. H. (2013). Respectful deference: Conformity revisited. In M. R. Banaji & S. A. Gelman (Eds.), *Navigating the social world: What infants, children, and other species can teach us* (pp. 230–234). New York: Oxford University Press.

Haun, D. B. M., Rekers, Y., & Tomasello, M. (2012). Majority-biased transmission in chimpanzees and human children, but not orangutans. *Current Biology, 22*, 727–731.

Haun, D. B. M., & Tomasello, M. (2011). Conformity to peer pressure in preschool children. *Child Development, 82*, 1759–1767.

Haun, D. B. M., Van Leeuwen, E. J. C., & Edelson, M. G. (2013). Majority influence in children and other animals. *Developmental Cognitive Neuroscience, 3*, 61–71.

Hermann, P. A., Legare, C. H., Harris, P. L., & Whitehouse, H. (2013). Stick to the script: The effect of witnessing multiple actors on children's imitation. *Cognition, 129*, 536–543.

Horner, V., & Whiten, A. (2005). Causal knowledge and imitation/ emulation switching in chimpanzees (*Pan troglodytes*) and children (*Homo sapiens*). *Animal Cognition, 8*, 164–181.

Huang, L. C., & Harris, M. B. (1973). Conformity in Chinese and Americans: A field experiment. *Journal of Cross-Cultural Psychology, 4*, 427–434.

Kenward, B. (2012). Over-imitating preschoolers believe unnecessary actions are normative and enforce their performance by a third party. *Journal of Experimental Child Psychology, 112*, 195–207.

Kenward, B., Karlsson, M., & Persson, J. (2011). Over-imitation is better explained by norm learning than distorted causal learning. *Proceedings of the Royal Society B: Biological Sciences, 278*, 1239–1246.

Keupp, S., Behne, T., & Rakoczy, H. (2013). Why do children overimitate? Normativity is crucial. *Journal of Experimental Child Psychology, 116*, 392–406.

Kim, H., & Markus, H. R. (1999). Deviance or uniqueness, harmony or conformity? A cultural analysis. *Journal of Personality and Social Psychology, 77*, 785–800.

Lyons, D. E., Damrosch, D. H., Lin, J. K., Macris, D. M., & Keil, F. C. (2007). The scope and limits of overimitation in the transmission of artefact culture. *Philosophical Transactions of the Royal Society B: Biological Sciences, 366*, 1158–1167.

Lyons, D. E., Young, A. G., & Keil, F. C. (2007). The hidden structure of overimitation. *Proceedings of the National Academy of Science of the United States of America, 104*, 19751–19756.

Marsh, L., Ropar, D., & Hamilton, A. (2014). The social modulation of imitation fidelity in school-age children. *PLoS One, 9*(1), e86127.
Meade, R. D. (1973). Conformity and anticonformity among Americans and Chinese. *Journal of Social Psychology, 89*, 15–24.
Nielsen, M., & Blank, C. (2011). Imitation in young children: When who gets copied is more important than what gets copied. *Developmental Psychology, 47*, 1050–1053.
Nielsen, M., Mushin, I., Tomaselli, K., & Whiten, A. (2014). Where culture takes hold: "Overimitation" and its flexible deployment in Western, Aboriginal, and Bushmen children. *Child Development, 85*, 2169–2184.
Nielsen, M., Simcock, G., & Jenkins, L. (2008). The effect of social engagement on 24-month-olds' imitation from live and televised models. *Developmental Science, 11*, 722–731.
Nielsen, M., & Tomaselli, K. (2010). Overimitation in Kalahari Bushman children and the origins of human cultural cognition. *Psychological Science, 21*, 729–736.
Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: Holistic versus analytic cognition. *Psychological Review, 108*, 291–310.
Over, H., & Carpenter, M. (2012). Putting the social into social learning: Explaining both selectivity and fidelity in children's copying behavior. *Journal of Comparative Psychology, 126*, 182–192.
Over, H., & Carpenter, M. (2013). The social side of imitation. *Child Development Perspectives, 7*, 6–11.
Schmidt, M. F. H., Rakoczy, H., & Tomasello, M. (2012). Young children enforce social norms selectively depending on the violator's group affiliation. *Cognition, 124*, 325–333.
Suizzo, M., & Cheng, C. (2007). Taiwanese and American mothers' goals and values for their children's futures. *International Journal of Psychology, 42*, 307–316.
van de Waal, E., Borgeaud, C., & Whiten, A. (2013). Potent social learning and conformity shape a wild primate's foraging decisions. *Science, 340*, 483–485.
Walker, M. B., & Andrade, M. G. (1996). Conformity in the Asch task as a function of age. *Journal of Social Psychology, 136*, 367–372.
Whiten, A., Horner, V., & de Waal, F. B. M. (2005). Conformity to cultural norms of tool use in chimpanzees. *Nature, 437*, 737–740.
Whiten, A., McGuigan, N., Marshall-Pescini, S., & Hopper, L. M. (2009). Emulation, imitation, over-imitation, and the scope of culture for child and chimpanzee. *Philosophical Transactions of the Royal Society B: Biological Sciences, 364*, 2417–2428.
Williams, T. P., & Sogon, S. (1984). Group composition and conforming behavior in Japanese students. *Japanese Psychological Research, 26*, 231–234.
Wu, P., Robinson, C. C., Yang, C., Hart, C. H., Olsen, S. F., Porter, C. L., et al (2002). Similarities and differences in mothers' parenting of preschoolers in China and the United States. *International Journal of Behavioral Development, 26*, 481–491.
Xiao, H. (1999). Independence and obedience: An analysis of child socialization values in the United States and China. *Journal of Comparative Family Studies, 30*, 641–658.
Yu, Y., & Kushnir, T. (2014). Social context effects in 2- and 4-year-olds' selective versus faithful imitation. *Developmental Psychology, 50*, 922–933.