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BRIEF REPORT

A Cross-Cultural Comparison of Children's Imitative Flexibility

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Recent research with Western populations has demonstrated that children use imitation flexibly to engage in both instrumental and conventional learning. Evidence for children's imitative flexibility in non-Western populations is limited, however, and has only assessed imitation of instrumental tasks. This study ($N = 142$, 6- to 8-year-olds) demonstrates both cultural continuity and cultural variation in imitative flexibility. Children engage in higher imitative fidelity for conventional tasks than for instrumental tasks in both an industrialized, Western culture (United States), and a subsistence-based, non-Western culture (Vanuatu). Children in Vanuatu engage in higher imitative fidelity of instrumental tasks than in the United States, a potential consequence of cultural variation in child socialization for conformity.

Keywords: cross-cultural comparisons, convention, imitation, social learning

Imitation is widely recognized as a core mechanism for acquiring information from others, yet the majority of research on this topic examines populations from Western, Educated, Industrial, Rich, and Democratic (WEIRD) backgrounds (Henrich, Heine, & Norenzayan, 2010; Legare & Nielsen, 2015; Nielsen & Haun, 2016). Ethnographic accounts suggest that there is significant cultural variation in children's social environments across different populations (Lancy, 2015). Starting in infancy, caregivers interact with children in diverse ways across cultures: there is variability in the amount of didactic pedagogy caregivers engage in (Bornstein, 2012; Harkness & Super, 2002; Lancy, Bock, & Gaskins, 2009) and the kind of cues caregivers use to guide attention (Kärtner et al., 2008; Kärtner, Keller, & Yovsi, 2010; Keller et al., 2009; Little, Carver, & Legare, 2016; Richman, Miller, & LeVine, 1992). Different interactional styles may reflect distinct child socialization goals (Steinberg, 2001; Tobin, Hsueh, & Karasawa, 2009). For example, children differentially respond to group consensus based on socialization practices that emphasize attention to social conformity versus individuality (Corriveau & Harris, 2010; Corriveau, Kim, Song, & Harris, 2013).

High fidelity imitation facilitates rapid and efficient social learning that allows for children to learn a skill without fully understanding its causal structure (Gergely & Csibra, 2006; Horner & Whiten, 2005). Despite ethnographic evidence of children's imitation across a number of diverse cultural contexts (Bolin, 2006; Gaskins & Paradise, 2010; Lancy, Bock, & Gaskins, 2009; Lancy, 2015; Rogoff, 2003) and archeological evidence that imitation is evident as far back as children's presence can be detected in material culture (Crown, 2010), to date only a handful of studies have examined children's imitation in non-Western cultures (Berl & Hewlett, 2015; Callaghan et al., 2011; Correa-Chávez & Rogoff, 2009; Goertz et al., 2011; Hewlett et al., 2011). The objective of this cross-cultural study was to examine cultural consistency and variation in imitative fidelity of instrumental and conventional behavior in a Western (United States) and a non-Western (Tanna, Vanuatu, a Melanesian archipelago) cultural context.

Imitative Flexibility

Children are well poised to engage in imitation to gain instrumental, or object-related, causal, knowledge (Lyons et al., 2007; McGuigan et al., 2007; Nielsen, 2006), but reasoning about causality is not relevant to all imitative behavior (Bird, Brindley, Leighton, & Heyes, 2007; Heyes, 2009; Leighton, Bird, & Heyes, 2010). New work has demonstrated that children also use imitation to acquire the conventional behaviors (Diesendruck & Markson, 2011; Keupp, Behne, & Rakoczy, 2013; Over & Carpenter, 2012) or rituals of their social groups (Legare & Watson-Jones, 2015; Wen, Herrmann, & Legare, 2016). There is also evidence that children are more likely to engage in high fidelity imitation when primed with ostracism (Over & Carpenter, 2009; Watson-Jones, Whitehouse, & Legare, 2016) suggesting that the motivation for high fidelity imitation of conventional behaviors is driven by social group affiliation (Watson-Jones & Legare, 2016; Watson-Jones, Legare, Whitehouse, & Clegg, 2014).

We propose that children have an early developing capacity to flexibly adapt their use of high fidelity imitation for social learning and that this capacity allows children to be efficient cultural learners. Children's flexible use of imitation may be guided by interpreting behavior as an *instrumental* versus a *conventional* act (Clegg & Legare, 2016; Herrmann, Legare, Harris, & Whitehouse,

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2013). The demands of learning instrumental skills (i.e., object-related knowledge based in physical-causal rationales) and social conventions such as rituals (i.e., socially stipulated, causally opaque behaviors of groups) are different in a number of key respects (Legare & Nielsen, 2015; Legare, Wen, Herrmann, & Whitehouse, 2015).

A defining feature of instrumental behavior is that the physical-causal rationales for actions are potentially knowable even if they are currently unknown (as is the case for the novice learner). Consequently, when children interpret a behavior as an instrumental act, they attend to the process of the behavior and the physical-causal relationships between actions with the objective of discerning the most efficient means of achieving the end-goal. Thus, learning an instrumental skill privileges identifying and eliminating actions that are not causally relevant to the end-goal and engaging in innovation, or variability in the execution of a behavior (Legare & Nielsen, 2015).

In contrast, learning conventional behaviors does not involve the same assumption that physical-causal rationales for a behavior are knowable or even relevant. Rather, conventional behavior is *causally opaque* (Legare & Souza, 2012). Thus, when children interpret a behavior as a conventional act, they attend to the process of the behavior to ascertain the precise way a behavior is executed and, consequently, attempt to recreate this process by engaging in higher fidelity imitation than when imitating instrumental behaviors (Clegg & Legare, 2016; Herrmann et al., 2013; Legare et al., 2015; Watson-Jones, Legare, Whitehouse, & Clegg, 2014). We propose that the objective of imitating conventional behavior is social group affiliation (Nielsen & Blank, 2011; Nielsen, Simcock, & Jenkins, 2008; Uzgiris, 1981) and norm acquisition (Over & Carpenter, 2012, 2013) and not instrumental skill acquisition or physical causal learning. In the context of learning conventional behavior, the reproduction of demonstrated actions, both causally relevant and irrelevant, through high fidelity imitation is an efficient learning strategy.

The capacity for high fidelity imitation may be linked to our species' capacity for incorporating innovation into our intergenerational transmission of skills and knowledge, known as cumulative culture (Boyd, Richerson, & Henrich, 2011; Pagel, 2012; Whiten & Erdal, 2012). Children's cultural learning and this intergenerational transmission of instrumental skills and conventional knowledge are supported by an interchange between imitation and innovation. We propose that when acquiring instrumental skills, there is a decrease in high fidelity imitation and an increase in innovation as children gain more experience and familiarity with a behavior. In contrast, when learning a conventional behavior, children maintain high levels of imitative fidelity and low levels of innovation, notwithstanding their level of experience with the behavior (Legare & Nielsen, 2015).

Cues to Instrumental Versus Conventional Behavior

Behaviors are often not easily interpretable as instrumental or conventional. For example, hand washing could be carried out for an instrumental purpose (e.g., removing dirt) or a conventional purpose (e.g., ritual ablution). When observing this behavior, children must determine whether to engage in high fidelity imitation of the process (e.g., pouring water over their hands a certain number of times or singing a particular song) or whether they should eliminate steps that are not necessary and attempt a more efficient or innovative means for achieving an instrumental goal (e.g., clean hands). Children must use social cues to adjudicate whether behaviors have a primarily instrumental or conventional goal (Herrmann et al., 2013; Legare, Wen, Herrmann, & Whitehouse, 2015), as we propose that children make this distinction between instrumental and conventional behavior as a matter of degree rather than kind.

Children are attentive to a number of social and contextual cues to discern whether a behavior is primarily an instrumental or a conventional act. Previous research by Legare and colleagues has demonstrated that children attend to causal opacity (i.e., whether or not a behavior has identical start- and end-states; Legare et al., 2015; Watson-Jones et al., 2014), consensus and synchrony among multiple actors (Herrmann et al., 2013), and the language used to describe a task (Herrmann et al., 2013; Legare et al., 2015), to determine whether to interpret a behavior as an instrumental versus conventional act (see Table 1).

Clegg and Legare (2016) found that framing a necklace-making task with conventional language (e.g., "Everyone always does it like this.") resulted in higher fidelity imitation than instrumental language (e.g., "I'm going to make a necklace.") for the same task. Children who heard the conventional language also transmitted the demonstrated behavior with higher fidelity than children who heard the instrumental language and were less likely to use the materials presented in the behavior in novel ways. There is also evidence that children cued with conventional language were better at identifying differences between actors' execution of an action sequence (Legare et al., 2015). These findings provide converging evidence that the different levels of imitative fidelity demonstrated between the instru-

Table 1
Cues to Instrumental Versus Conventional Interpretations of Behaviors

Social cue	Instrumental	Conventional
Language used to describe task[a,b,c,d]	Goal-oriented language (e.g., I'm going to do X.)	Convention-oriented language that emphasizes group norms and/or continuity of performance (e.g., Everyone always does it like this.)
Causal opacity[a,e,f]	Distinct start- and end-states (e.g., an unlit candle is lit to light a room)	Identical start- and end-states (e.g., an unlit candle is lit, a few words are said, and then the flame is extinguished)
Consensus[b,g]	Distinct actors display different behaviors	Distinct actors display the same behaviors
Synchrony[b]	No synchrony across actors	Synchrony in performance across actors

Note. From *Imitation and innovation: The dual engines of cultural learning*, by C. H. Legare & M. Nielsen, 2015, *Trends in Cognitive Sciences*, 19, p. 692. Copyright 2015 by Elsevier.
[a] Legare et al. (2015). [b] Herrmann et al. (2013). [c] Clegg and Legare (2016). [d] Moraru, Gomez, and McGuigan (2016). [e] Watson-Jones et al. (2014). [f] Nielsen, Kapitany, and Elkins (2015). [g] Wilks, Collier-Baker, and Nielsen (2015).

mental and conventional language conditions in these studies are because of children's distinct interpretations of the purpose of the demonstrated behaviors and that these interpretations impact what children attend to and ultimately reproduce.

Current Study

Data from multiple studies support the claim that children flexibly use high fidelity imitation for social learning (see Table 1), but to date, none of this research has examined children's flexible imitation in non-Western cultural settings. Previous research with non-Western populations has examined children's imitation in the context of instrumental learning (Berl & Hewlett, 2015; Nielsen et al., 2014; Nielsen & Tomaselli, 2010). These studies have used tasks that have clear end-goals (i.e., the retrieval of a prize) and highlight physical-causal relationships between actions (Lyons, Young, & Keil, 2007; McGuigan, Whiten, Flynn, & Horner, 2007). In these tasks, children from both Western (United States, United Kingdom, and Australia) and non-Western (Kalahari Desert, Australian Aborigines, and Ngandu) cultural contexts faithfully copy both the causally relevant and causally irrelevant actions demonstrated (Nielsen et al., 2014; Nielsen & Tomaselli, 2010). Children from an Aka hunter-gatherer community, however, did not engage in similar levels of imitation of causally irrelevant actions as other populations of children. Potential explanations for this include Aka children's more limited exposure to Western education and causally opaque artifacts than other populations sampled, and the more egalitarian and autonomous nature of Aka society (Berl & Hewlett, 2015). Additional research is needed to examine cultures that differ along specific variables, such as exposure to Western education practices and levels of autonomy and independence versus interdependence and conformity, to examine why differences may exist in children's tendency to imitate or eliminate causally irrelevant actions.

Here we examine cultural consistency and variation in imitative fidelity of instrumental and conventional behavior in a Western (United States) and a non-Western (Tanna, Vanuatu) cultural context. We used an experimental task based on an activity that children were familiar with in both cultural contexts—necklace-making[1] (Clegg & Legare, 2016). We chose this activity to eliminate children's perception of the task as unfamiliar, as this perception alone may lead to high fidelity imitation (Lyons, Damrosch, Lin, Macris, & Keil, 2011; Lyons et al., 2007; Williamson & Meltzoff, 2011). The use of a necklace-making activity allowed us to link high fidelity imitation directly to the manipulation of the social information presented about the task rather than the nature of the task itself. The necklace-making action sequence we used was designed to be novel for children in both the United States and Vanuatu, so that the specific sequence modeled was not familiar, but rather that the activity of making a necklace (in general) was. We incorporated both instrumental elements (i.e., bead stringing) and conventional elements (i.e., bead pattern, novel gestures with the materials) and varied the verbal cues used to describe the activity so that the task could be framed instrumentally or conventionally. We used verbal cues given the need to use solo live models in both research settings and because the verbal cues gave us the ability to compare imitation of the same action sequence based on an instrumental versus conventional framing, rather than altering the action sequence itself, as would be required to explore the other cues to conventionality that have been examined in previous research (see Table 1).

Data were collected in coastal villages in Tanna, Vanuatu, and a university city in the American Southwest. The coastal villages each had a primary school that most children attended, though child socialization in Vanuatu is based on fostering collective and cooperative values and children's learning both in and out of schools is characterized by lower levels of dyadic adult-child pedagogy (Clegg, Wen, Hartman, & Legare, 2015; Little et al., 2016), a greater reliance on observational learning (Aknin, Broesch, Hamlin, & Van de Vondervoort, 2015; Peck & Gregory, 2005), and a strong emphasis on social conformity (Strachan, Samuel, & Takaro, 2007). Ni-Vanuatu parents expect children—from a very young age—to be responsible for assisting adults in subsistence-based labor (e.g., cooking, planting, and harvesting crops, and helping with the childcare of younger siblings; Little et al., 2016) and to learn how to complete these tasks through observational learning (Aknin et al., 2015; Clegg et al., 2015). In response to an interview on children's socialization and learning, all of the caregivers interviewed mentioned that children learn by watching others (Clegg et al., 2015). Moreover, when asked to evaluate the performance of children engaging in high and low fidelity imitation of the necklace-making task used in the present study, we also found that Ni-Vanuatu caregivers evaluated the child engaging in high fidelity imitation as more intelligent and better behaved, suggesting a cultural endorsement of conformity (here we define conformity as closely imitating an adult model; Wen, Clegg, & Legare, 2015).

In contrast, U.S. children, particularly those from middle and high socioeconomic status (SES) families, are exposed to high levels of dyadic child-directed interaction and pedagogy from an early age (Callaghan et al., 2011; Lancy, 2010, 2015). Though young children may participate in some chores, their efforts are often not essential to the functioning of the household (Rogoff, 2003) and often require parental encouragement and scaffolding (Pettygrove, Hammond, Karahuta, Waugh, & Brownell, 2013). Creativity and individuality are also strongly encouraged in the Unite State (Lawton, Schuler, Fowell, & Madsen, 1984; Tobin et al., 2009). When asked to evaluate the performance of children engaging in high and low fidelity imitation of the necklace-making task, U.S. caregivers were more likely than Ni-Vanuatu caregivers to select the child that imitated with low fidelity as more intelligent, often citing her ability to think creatively and not to follow the adult's modeled sequence too closely (Wen, Clegg, & Legare, 2015).

Cultural differences in socialization may impact children's use of imitation as a flexible tool for learning. Like children from other non-Western populations with low levels of Western-style education (Correa-Chávez & Rogoff, 2009; Rogoff, 2003) Ni-Vanuatu children rely on observation of adults and more capable peers to learn the skills

[1] The first author observed bead and material stringing activities in kindergartens in both the United States and Vanuatu. Moreover, necklaces made of shells, glass beads, and pig-tusks have long been a part of Ni-Vanuatu culture. Necklaces have been found in many Ni-Vanuatu burial sites (Valentin, Spriggs, Bedford, & Buckley, 2011) and were documented as ornamentation worn by Tannese men in the 1700s (Bonnemaison, 1986/1994; Forster, 1777). Today, Ni-Vanuatu women make necklaces to sell at markets (Douglas & Douglas, 2004; Singh & Hemstock, 2013) and men, women, and children were observed wearing necklaces during our time in Tanna.

and practices of their culture, whereas U.S. children typically learn through dyadic pedagogical interactions with adults. Additionally, Ni-Vanuatu children may experience high expectations for conformity because of the collectivist nature of Ni-Vanuatu culture (Dadkhah, Harizuka, & Mandal, 1999; Walker, 2013). Given these distinct cultural expectations for children's learning and conformity, there are two possibilities for cultural variation between children from the United States and Vanuatu in imitative fidelity. One possibility is that more extensive experience with third party observation coupled with higher expectations for conformity would result in Ni-Vanuatu children demonstrating higher levels of imitative fidelity overall. Another possibility is that if children make the distinction between instrumental and conventional behavior across cultures and modify their imitative fidelity accordingly, variation in imitative fidelity will be evident only for instrumental tasks. In conventional learning, high fidelity imitation should be universally privileged; therefore, children should demonstrate similarly high levels of imitation across cultures. In instrumental learning, however, there may be cultural variation in encouragement to engage in innovative or creative behaviors, particularly for novice learners (Lancy, 1996). We predicted that the impact of variation in cultural expectations for innovation or conformity may only be detectable in an instrumental task, with Ni-Vanuatu children demonstrating higher levels of imitative fidelity than U.S. children.

Method

Participants

Data from 57 children (22 females) from 1st and 2nd year classrooms in primary schools in Lenakel and Isingel, Tanna, Vanuatu were included in the study. When possible, we obtained birthdate information from teachers and school officials, but many students did not have exact birthdate information available. Based on our conversations with school officials and local Peace Corps volunteers, we recruited participants from 1st and 2nd year classrooms because children in those classes tended to be between 6 and 8 years of age. We piloted this study with younger children (3- to 5-years-old) but found that children in this age group were unable to proceed past a warm-up game before electing to end the study. Previous studies of children's imitation in non-Western cultures have sampled children from 2 to 13 years of age (Berl & Hewlett, 2015 – 4–7-year-olds; Nielsen et al., 2014 – 3–6-year-olds; Nielsen & Tomaselli, 2010 – 2–13-year-olds). The necklace-making task employed in the present study had been previously used in studies examining 3- to 6-year-old children's imitative flexibility (Clegg & Legare, 2016) though 6-year-olds were far from ceiling on the task.

To ensure that children were fluent in Bislama, the lingua franca of Vanuatu and the language used for translating study materials, children engaged in a warm-up picture memory task. Children were presented with three pictures and then asked to find the pictures among three sets of novel pictures. Children needed to answer at least one of the memory questions correctly to participate in the study. We were highly stringent in our inclusion criteria and worked with a local research assistant to translate the content of each experimental session to ensure consistency with the study protocol. One additional Ni-Vanuatu child elected to end her participation in the study, so her data were dropped from analyses.

Children were from families that were employed in a variety of subsistence living (Aknin et al., 2015; Atkinson et al., 2010; Lindstrom, 1996) and tourism activities (Méheux & Parker, 2006) and their parents typically had limited exposure to Western education beyond primary or limited amounts of secondary school. Though maternal education data was not collected for the children in this study, data from similar studies collected in Tanna during this time indicate that women of child rearing age have attended on average 6–7 years of formal schooling (Little et al., 2016).

Data from 85 6- to 8-year-olds (38 females; *M* age = 7.6, age range 6,0 – 8,11) recruited from a participant database in an urban university town in the American southwest to match the age of the Ni-Vanuatu sample were also included in the study. Children were primarily Euro American and from middle- to high-SES families and approximately 95% of the mothers in our sample had attended college. To ensure consistency in design across cultures, children in the United States also participated in the picture warm-up task (in English) used to assess language proficiency in Vanuatu. One additional U.S. child elected to end her participation in the study, so her data were dropped from analyses.

Procedure

In Vanuatu, testing was conducted in a quiet room or secluded outdoor area in each of the recruitment locations. The study protocol was translated into Bislama and back-translated into English by two Ni-Vanuatu teachers with high English proficiency. Two female Ni-Vanuatu research assistants were recruited from local villages and were extensively trained by the first author on how to execute the protocol. The Ni-Vanuatu research assistants were from the communities where we recruited the children, but were not relatives of the chiefs or teachers at the school, indicating that their level of prestige was similar to that of the children's parents. The first author was present for all sessions. All sessions were transcribed and translated back to English to ensure compliance with the experimental protocol.

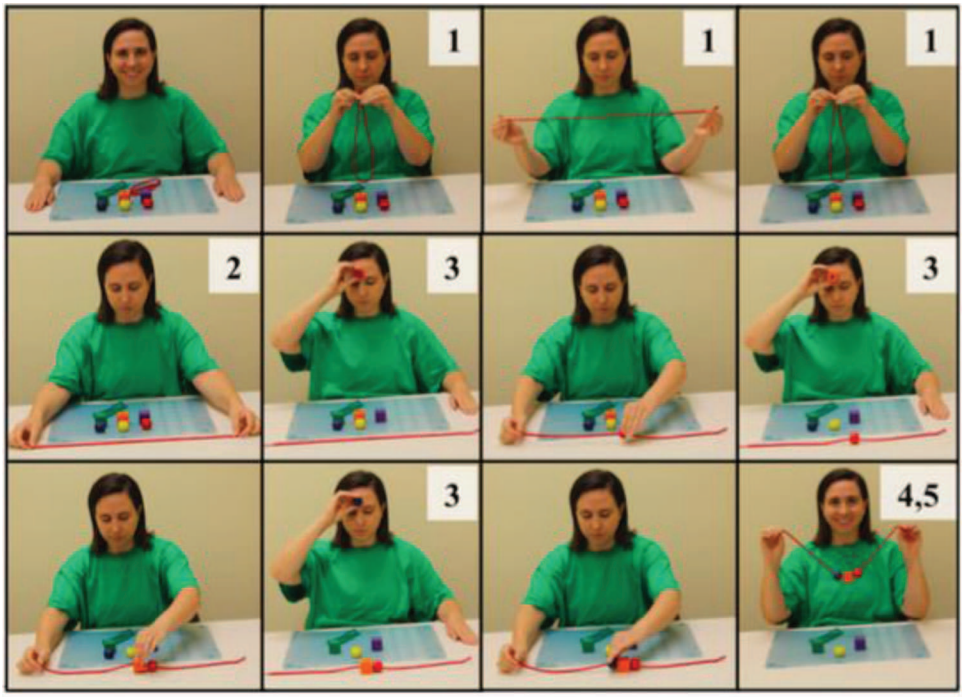
In the United States, testing was conducted in English in a quiet room in the university children's laboratory center. The first author (female, mid-20s) conducted all testing after building rapport with children to establish a level of comfort with the experimental setting and familiarity with the experimenter.

All children in the study participated in an *imitation task* and were randomly assigned to one of two conditions (instrumental and conventional conditions) in a between-subjects design. During this task, children watched an experimenter demonstrate a necklace-making sequence and were then given an opportunity to interact with the stimuli.

Imitation task. After building rapport through a picture memory game, the research assistant (RA) told children they would be completing a new activity and placed a set of necklace-making materials (a plastic placemat with one row of three circular beads—red, yellow, and blue (left to right)—in front of a row of three square beads—purple, yellow, and green (left to right) in front of two folded strings—red and green) on the table. The RA then gave the children one of two language prompts while smiling, with both hands flat on either side of the tray: In the *instrumental condition*, children heard an outcome-oriented explanation of the task, "I am going to make a necklace. Let's watch what I am doing. I am going to make a necklace." (Bislama – "Nao ia bae mi mekem nekles. Wacem mi wanem mi stap mekem. Nao ia bae mi mekem nekles.") In the *conventional condition* children heard a

convention-oriented explanation, "Everyone always does it like this. Let's watch what I am doing. Everyone always does it like this." (Bislama – "Everiwan oli mekem i saemak ol teim. Watcem mi wanem mi stap mekem. Everiwan oli mekem i saemal ol teim.") These language prompts were modeled after those used in previous research examining children's imitative fidelity when distinguishing between instrumental and conventional acts (Clegg & Legare, 2016; Herrmann et al., 2013; Legare et al., 2015).

The RA began the sequence by looking down and picking up the red string. She held one end of the red string in each hand, stretched the string into a straight line, and then brought the ends back together in front of her. Next she repeated this action once more before stretching the string into a straight line and placing it in front of the tray (the side closest to the child) and removing her hands. She then picked up the red circular bead and touched it to her forehead before stringing it on the right side of the string and moving the bead to the middle of the string. She repeated this sequence for the orange square bead and the blue circular bead. After the experimenter placed the blue bead on the string, she picked one end of the string up in each hand, held the necklace up, and while smiling said, "Look what I did!" (Bislama – "Lukem!"; Figure 1). After finishing the sequence, she placed the necklace back on the tray and removed the tray from the child's view. Children in both conditions viewed the same sequence. We chose



Component of action sequence	Description of model's (M) behavior	Operational criteria for coding
1. Stretch string	M brings the ends of the string together and then opens it twice.	The child brings the ends of the string together and opens it at least once.
2. Place string	M lays the string out on the table above the tray.	The child lays the string out on the table.
3. Three bead to forehead touches	M touches the purple, yellow, & green beads to forehead before placing them on the string.	The child touches three beads to their forehead before placing them on the string.
4. Circle, square, circle	M's necklace consists of three beads in order– a circular bead, a square bead, and a circular bead.	The child's necklace consists of a circular bead, a square bead, and a circular bead in order.
5. Three beads	M's necklace consists of only three beads.	The child's necklace consists of only three beads.

Figure 1. Necklace-construction sequence and target behaviors included in imitative fidelity score. From "Instrumental and conventional interpretations of behavior are associated with distinct outcomes in early childhood" by J. M. Clegg and C. H. Legare, 2016, *Child development*, 87, p. 533. Copyright 2016 by Wiley. Adapted with permission. The individual who appears here gave signed consent for her likeness to be published in this article. See the online article for the color version of this figure.

to use a live model demonstration based on both previous work examining imitation cross-culturally (Berl & Hewlett, 2015; Nielsen et al., 2014; Nielsen & Tomaselli, 2010) and Ni-Vanuatu children's lack of exposure to electronic technology.

Next, children were allowed to engage with a duplicate set of the beads and string used by the RA, positioned in the same (left to right) orientation. While the RA moved the tray of objects toward the child she said, "Here you go. Now it's your turn!" (Bislama – "Nao ia hemi turn blong yu.") Children's engagement with the objects was video-recorded and coded for imitative fidelity. If children sought help from the experimenter, the experimenter gave a neutral answer, "Do what you think you should do." (Bislama – "Yu save mekem wanem yu tingting.") At the end of engagement or after 90 s, the objects were moved out of the child's reach and hidden from view.

Coding. Each child was assigned an imitative fidelity score between 0 and 5 that was indicative of the number of target behaviors of the modeled necklace-construction sequence they imitated (Figure 1 illustrates scoring procedures; scoring categories were based on those used for the same task in Clegg & Legare, 2016). Data were coded by a research assistant blind to the condition of the participant and the hypotheses of the study. Data from 30% of both the United States and Ni-Vanuatu samples (43 children total) were independently coded to assess interrater reliability. The second coder was blind to the hypotheses of the study and the condition to which each child was assigned. Reliability was calculated for the imitative fidelity score and coders demonstrated 98.1% agreement with the κ for this coding falling within very good agreement (.81 and above) levels (Landis & Koch, 1977). Each of the target elements included in the table in Figure 1 were also analyzed using nonparametric tests to examine frequency of engagement across conditions and cultures.

Results

To assess the impact of convention-versus outcome-oriented language cues and culture on children's imitative fidelity a Condition (instrumental vs. conventional) × Country (2: United States vs. Vanuatu) analysis of variance (ANOVA) was conducted. There was not a significant interaction between condition and country, $F(1, 141) = 1.77$, $p = .196$, so it was removed from subsequent analyses. As predicted, children in the conventional condition ($M = 3.46$, $SD = 1.42$) demonstrated higher levels of imitative fidelity than children in the instrumental condition ($M = 2.43$, $SD = 1.27$), $F(1, 141) = 20.86$, $p < .001$, $\eta^2 = 0.15$ (see Figure 2). Planned comparisons indicated that this effect of condition was also evident within each culture. U.S. children demonstrated a significant difference in imitative fidelity between conditions, with children in the conventional condition producing more of the target behaviors ($M = 3.45$, $SD = 1.60$) than children in the instrumental condition ($M = 2.19$, $SD = 1.28$), $t(83) = 4.03$, $p < .001$, 95% confidence interval (CI) [0.64, 1.89], $d = 0.87$. Ni-Vanuatu children in the conventional condition also had higher imitative fidelity scores ($M = 3.46$, $SD = 1.14$) than children in the instrumental condition ($M = 2.79$, $SD = 1.18$), $t(55) = 2.19$, $p < .05$, 95% CI [0.07, 1.29], $d = 0.58$.

There was not a main effect of country, $F(1, 141) = 1.87$, $p = .173$, $\eta^2 = 0.01$, indicating that overall levels of imitative fidelity were comparable across countries. Because of a priori predictions about between country differences within the instrumental condition, planned comparisons were conducted between country for both the instrumental and conventional conditions. In the instrumental condition, there was significant difference in imitative fidelity between United States ($M = 2.19$, $SD = 1.28$) and Ni-Vanuatu ($M = 2.79$, $SD = 1.18$) children, $t(70) = 2.07$, $p < .05$, 95% CI [0.02, 1.19], $d = 0.49$. In the conventional condition, United States ($M = 3.45$, $SD = 1.60$) and Ni-Vanuatu ($M = 3.46$, $SD = 1.14$) children demonstrated similar levels of imitative fidelity, $t(68) = 0.04$, $p = .971$, 95% CI [−0.64, 0.66], $d = 0.007$. These findings support the hypothesis that differences in imitative fidelity across cultures would only be detectable for instrumental tasks.

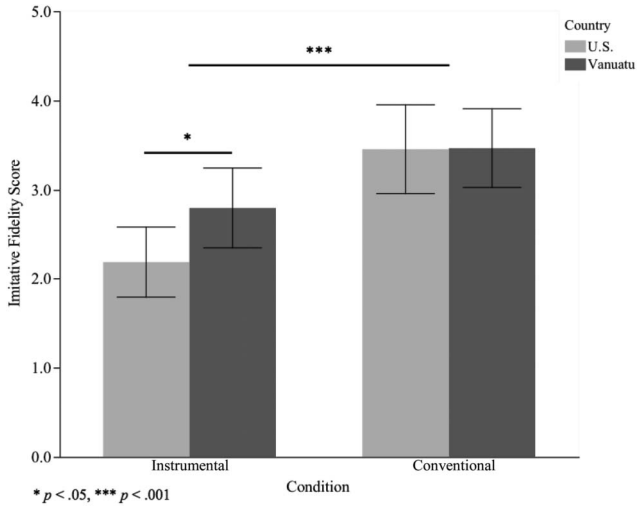


Figure 2. Imitative fidelity score by condition and country. Error bars represent a 95% confidence interval of the mean.

For a summary of the percent of children that imitated each target action of the imitative fidelity score by country and condition, see Table 2. Logistic regression analyses were conducted to examine the effects of country (2: United States, Vanuatu) and condition (2: instrumental, conventional) on whether children imitated the target elements at Bonferroni adjusted α-levels of .01 per test (.05/5 target elements). For a summary of the results of each logistic regression, see Table 3. There was a significant interaction between country and condition, in addition to a main effect of country and condition, for three bead- to forehead touches. Ni-Vanuatu children imitated the three bead to forehead touches at similar rates across conditions, $\chi^2(1, N = 142) = .23$, $p = .63$. U.S. children in the conventional condition were more likely to imitate the three bead to forehead touches than U.S. children in the instrumental condition, $\chi^2(1, N = 142) = 22.27$, $p < .001$. Overall, U.S. children in the instrumental condition imitated the three bead to forehead touches at the lowest rates. There was a significant main effect of country for place string, with U.S. children placing the string at higher rates than Ni-Vanuatu children, $\chi^2(1, N = 142) = 7.48$, $p < .01$. There was a significant main effect of condition for both the stretch string and circle, square, circle pattern elements, such that children (both United States and Ni-Vanuatu) in the conventional condition imitated both target elements at higher rates than children in the instrumental condition

Table 2
Percent of Children Engaging in Target Elements by Country and Condition

Target element	United States		Vanuatu	
	Instrumental	Conventional	Instrumental	Conventional
Stretch string	23.3%	66.7%	44.8%	64.3%
Place string	79.1%	64.3%	41.4%	57.1%
Three bead to forehead touches	16.3%	66.7%	65.5%	71.4%
Circle, square, circle	34.9%	66.7%	51.7%	64.3%
Three beads	65.1%	81.0%	75.9%	89.3%

(Stretch string – $\chi^2(1, N = 142) = 16.2$, $p < .001$; Circle, square, circle – $\chi^2(1, N = 142) = 8.25$, $p < .01$).

Discussion

Children acquire the instrumental skills and conventional behaviors of their cultural groups over the course of ontogeny. Imitation is an early developing social learning mechanism for acquiring these skills and behaviors (Gergely & Csibra, 2006; Horner & Whiten, 2005; Tomasello, Carpenter, Call, Behne, & Moll, 2005) and recent research suggests that children use imitation flexibly when learning instrumental versus conventional behaviors (Clegg & Legare, 2016; Legare et al., 2015). The majority of the research on imitation, however, has been conducted exclusively in Western cultural contexts and has examined children's imitation of instrumental behaviors, which limits the ability to make broad claims about flexible imitation as an effective, culturally pervasive tool for social learning.

To gather evidence consistent with the possibility that flexible imitation may be a universal tool for cultural learning, we must move beyond solely examining Western populations, which growing evidence demonstrates are unrepresentative of human culture more globally (Henrich, Heine, & Norenzayan, 2010; Jensen, 2012). Although high fidelity imitation of causally irrelevant actions has not been documented in nonhuman primates (Horner & Whiten, 2005), the lack of this behavior in other primates is not sufficient evidence for human-specific universality (Haun, 2015). Furthermore, the limited amount of previous research of children's imitation outside of Western cultural contexts (Nielsen et al., 2014) has only addressed children's instrumental learning. To become competent cultural members, children must learn *both* the instrumental and conventional skills of their social groups. Building a comprehensive and globally representative theory of imitative flexibility requires cross-cultural comparisons of instrumental and conventional imitation.

Our data demonstrate that children in the United States and Vanuatu cued with convention-oriented language (conventional condition) engaged in higher levels of imitative fidelity than children cued with outcome-oriented language (instrumental condition). Though it is important to note that these data can only speak to children's behavior in two cultures, this study provides the first evidence of children's flexible use of imitation cross-culturally. The data support our claim that children adapt their use of high fidelity imitation in response to their interpretation of a behavior as an instrumental or conventional act depending on the social information presented.

Our data also suggest that there may be cultural variation in imitative fidelity, particularly for the imitation of instrumental tasks. Within the instrumental condition, Ni-Vanuatu children engaged in higher imitative fidelity than U.S. children. A number of cultural factors could have led to cultural differences in imitative fidelity, including a greater cultural emphasis on conformity (Strachan, Samuel, & Takaro, 2007) and reliance on observational learning in Vanuatu (Peck & Gregory, 2005) and higher levels of autonomy in the United States (Berl & Hewlett, 2015; Steinberg, 2001). Further research is needed to explore the mechanisms that might have lead to this difference in imitative fidelity across cultures and to examine the link between cultural expectations for conformity and pedagogical styles and children's flexible use of imitation.

The difference in imitative fidelity of instrumental tasks between Ni-Vanuatu and U.S. children is noteworthy given previous research that has found high levels of cross-cultural consistency in

Table 3
Summary of Logistic Regression Examining Effects of Country (2: United States, Vanuatu) and Condition (2: Instrumental, Conventional) on Children's Replication of Each of the Target Elements of Imitative Fidelity Score

Target element	Country		Condition		Interaction[a]	
	$\chi^2(1, N = 142)$	p	$\chi^2(1, N = 142)$	p	$\chi^2(1, N = 142)$	p
Stretch string	1.48	.22	16.72	<.001*		n.s.
Place string	7.46	<.01*	.10	.75		n.s.
Three bead to forehead touches	11.01	<.001*	11.69	<.001*	7.07	<.01*
Circle, square, circle	.79	.37	8.40	<.01*		n.s.
Three beads	1.85	.17	4.53	.03		n.s.

[a] Interaction removed from analysis if not significant.
* Significant at Bonferroni adjusted α levels of .01 per test (.05/5).

children's imitation in the context of instrumental learning (Nielsen et al., 2014; Nielsen & Tomaselli, 2010). These studies used unfamiliar, causally opaque puzzle box tasks to examine imitative fidelity across cultures, which may have led to higher levels of imitation than would be expected for a familiar task (Berl & Hewlett, 2015; Lyons et al., 2007). In the present study, we presented children in both cultures with a task that they were familiar with and only altered the social information presented about the task.

Ni-Vanuatu children in the instrumental condition also demonstrated similar rates of imitating the three bead to forehead touches target element as Ni-Vanuatu children in the conventional condition, whereas U.S. children in the instrumental condition tended to eliminate this target element. The bead to forehead touches could be considered one of the more causally irrelevant actions demonstrated in the necklace-making sequence, so this variation in imitation rates across cultures is noteworthy. It is possible that children in both cultures inferred the causal-irrelevance of these actions, but Ni-Vanuatu children imitated the bead to forehead touches with higher fidelity because of greater cultural expectations for social conformity, whereas U.S. children eliminated them because of greater cultural encouragement of innovation and creativity (Lancy, 1996; Tobin et al., 2009).

We also recognize the need for caution in interpreting these results given the novelty of the experimental setting for Ni-Vanuatu children. One-on-one attention and instruction from an adult is not as common for Ni-Vanuatu children as it is for U.S. children, so it is possible that this may have influenced Ni-Vanuatu children's imitative fidelity. We argue, however, that the potential influence of the experimental setting alone is not exclusively responsible for the results we observed, given that we only tested children with some experience with Western-schooling (e.g., with some exposure to one-on-one pedagogy). In fact, the difference that we see in Ni-Vanuatu children's imitative fidelity between the instrumental and conventional conditions suggests that they were differentially responding to the verbal cues regardless of the novelty of the experimental setting. Moreover, the similarity in United States and Ni-Vanuatu children's imitative fidelity scores in the conventional condition, despite the difference in the relative novelty of the experimental setting between the two cultures, indicates that children are responding in similar ways to cues about the conventionality of a task. This means that children in both cultures not only engage in flexible imitation based on the information presented about a task, but that imitation in instrumental contexts may also differ across cultures.

In summary, our data provide evidence consistent with our proposal for a culturally pervasive distinction between instrumental and conventional imitation, which may be mediated by culture-specific expectations for conformity and child socialization practices. This study provides both novel insight into children's use of imitation as a strategy for cultural learning and supports our proposal that flexible imitation may be a universal tool for transmitting cultural practices.

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