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Selective Imitation of In-Group Over Out-Group Members in 14-Month-Old Infants

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Recent research has shown that infants are more likely to engage with in-group over out-group members. However, it is not known whether infants' learning is influenced by a model's group membership. This study investigated whether 14-month-olds ($N = 66$) selectively imitate and adopt the preferences of in-group versus out-group members. Infants watched an adult tell a story either in their native language (in-group) or a foreign language (out-group). The adult then demonstrated a novel action (imitation task) and chose 1 of 2 objects (preference task). Infants did not show selectivity in the preference task, but they imitated the in-group model more faithfully than the out-group model. This suggests that cultural learning is beginning to be truly cultural by 14 months of age.

Culturally specific ways of doing things are extremely important to humans. In everything from the way we eat, dress, and speak, to the beliefs and attitudes we hold, to the ceremonies and rituals we perform and beyond, we make ourselves similar to the people around us. This alignment with our fellow group members results in the countless number of cross-cultural differences we see across human groups. Throughout their development, children must thus learn a vast amount of information about how "we" in our group do things, which is often not so easy, as much of the information that children need to learn is arbitrary and causally "opaque" (Gergely & Csibra, 2006). On the surface it is not obvious why, for example, some people eat rice with forks instead of chopsticks or pronounce the same word differently.

So how do children learn to act and think the way other members of their group do? Imitative learning obviously plays a key role, but there are at least two ways in which it might do so. That is, some accounts of children's imitative learning propose that a particular feature of human children's imitation, the tendency to copy others "overly" faithfully, is linked to the need to learn so much arbitrary, often opaque information (e.g., Gergely & Csibra, 2006; Lyons, Young, & Keil, 2007; Whiten, McGuigan, Marshall-Pescini, & Hopper, 2009). According to these accounts, young children have a more or less automatic tendency to see adults' actions as causally or culturally relevant and thus worth copying and learning, especially when the actions are accompanied by ostensive-communicative, pedagogical cues from the adult (Csibra & Gergely, 2009). This automatic tendency, it is argued, is what supports faithful transmission and thus contributes to differences in ways of doing things across cultures.

In contrast, other accounts see children's imitation as more flexible and selective, although still often tied to the need to learn culturally specific ways of doing things. These accounts, which emphasize the social functions of imitation together with its learning functions, see imitation as a way of affiliating, aligning oneself, and identifying with

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others, at both the dyadic and group levels (e.g., Nadel, Guérini, Pezé, & Rivet, 1999; Nielsen, Simcock, & Jenkins, 2008; Over & Carpenter, 2012; Uzgiris, 1981). They predict that children should imitate differentially depending on the social context. At the dyadic level, there is empirical support for these accounts. For example, children copy others more closely when they have a goal to affiliate (Over & Carpenter, 2009) and when the model is socially responsive (Nielsen et al., 2008). At the group level, that is, at the level of cultural learning, or imitating to align oneself more closely with one's social group, little work has been done, especially in very young children as they first start down the path of learning how "we" in our group do things.

The automatic accounts of children's imitation do not consider the influence of social factors like group membership, apparently assuming that since children are typically surrounded by in-group members automatic copying should work well. Thus, it is important to investigate whether infants will copy a member of their own in-group more closely than a member of an out-group. One of the most obvious indicators of group membership is the language one speaks, and studies show that even young infants respond differently to people who speak different languages. For example, Kinzler, Dupoux, and Spelke (2007) showed that 6-month-olds spend more time looking at someone who has previously spoken their native language than someone who has previously spoken a foreign language. They also showed that when offered identical objects by a native language speaker versus a foreign language speaker, 10-month-olds prefer to take the object offered by the native language speaker. Kinzler, Corriveau, and Harris (2011) have recently shown that much older children, 4- to 5-year-olds, selectively endorse a native-accented speaker's demonstration of how an object is used over that of a foreign-accented speaker. However, given that children begin learning culturally specific attitudes and ways of doing things in infancy, it is important to investigate whether infants, too, will learn selectively from in-group over out-group models.

In the current study, we investigated two types of cultural learning: infants' copying of the particular way people in their group do things and infants' adoption of others' attitudes about or preferences for things. For both types of tasks, 14-month-old infants first were shown a series of videos in which a model told a short story either in the infants' native language (in-group condition) or in a foreign language (out-group condition), in a between-subjects design. Then infants watched as that same model silently demonstrated an unusual novel action on an object (in each of two imitation tasks) or silently chose one of two novel objects to keep (in each of two preference tasks). For the imitation tasks, we predicted that infants would be more likely to copy the unusual actions from the in-group model, because there is growing evidence of infants' ability to imitate selectively and appropriately based on other characteristics of the model besides group membership at this age (e.g., Gergely, Bekkering, & Király, 2002; Seehagen & Herbert, 2011; Zmyj, Buttelmann, Carpenter, & Daum, 2010; Zmyj, Daum, Prinz, Nielsen, & Aschersleben, 2012). For the preference tasks, the prediction was less clear: On one hand, infants might be more likely to copy the preference of in-group members since at least some preferences can be culturally determined (e.g., preferred styles of music or dress). On the other hand, infants might appreciate the individual and subjective nature of preferences, which might lead them not to copy the model's preferences differentially. Currently, findings involving infants' understanding and adoption of others' preferences (none of which involve group membership) are quite mixed in the literature (see, e.g., Buresh & Woodward, 2007; Gergely, Egyed, & Király, 2007; Luo & Baillargeon, 2005; Repacholi & Gopnik, 1997; Zmyj et al., 2010).

Method

Participants

A total of sixty-six 14-month-olds (M = 14 months; 0 days; range = 13;15 to 14;15; 30 girls) participated in the study. Additional infants were tested but not included in the final sample because of fussiness (n = 3), refusal to touch the objects at test (n = 5), experimenter error (n = 1), familiarity with some aspects of the task (e.g., the apparatuses) before the test (n = 5), or not completing all four tasks (n = 21). Infants were recruited from a database of parents who had volunteered to participate in child development studies in a mid-sized German city. According to parental report, all participants included in the final sample came from monolingual German families, with German being the only language spoken to infants since birth.

Design

The experiment consisted of two pairs of tasks: a pair of *imitation tasks* and a pair of *preference tasks*.

The order of the pairs of tasks and the order of the tasks within each pair were fully counterbalanced. One half of the infants participated in each of the four tasks in the in-group condition and the other half in the out-group condition.

Materials

For one of the imitation tasks, the *head-touch task*, a round lamp (12 cm diameter) mounted on a black rectangular board (27 × 20 cm) was used. The lamp could be illuminated by pressing on the top (as in Meltzoff, 1988). Two versions of the lamp were used. For the video sequences, the board to which the lamp was attached was horizontally oriented. For the lamp that was presented to infants the board was tilted by 30° to facilitate head touches. For the other imitation task, the *sit-touch task*, a rectangular plexiglass box (60 × 22 × 14 cm) with six small, differently colored lamps inside was used (as in Buttelmann, Carpenter, Call, & Tomasello, 2007). The lamps could be illuminated by pressing on top of the box.

Four novel objects were used in the preference tasks. For one of these tasks the objects were a yellow octagonal box (12 × 12 × 12 cm) and a pink cylinder (9 × 14 cm). For the other task the objects were a blue cone (10 × 25 cm) and a green elliptical box (15 × 12 × 8 cm).

Procedure

Infants and their parent were first escorted to a reception room for a warm-up period with the experimenter. Then the infant and parent were brought to the testing room. Infants sat on their parent's lap at a table approximately 80 cm away from a 24-in. monitor (SONY GDM-FW900, Sony Corporation, Tokyo, Japan; screen resolution 800 × 600 pixels). The general procedure was as follows: For each of the imitation and preference tasks (see below), first, infants watched a short familiarization video, in either the in-group or the out-group condition, and then all infants watched the same test video. Infants were then given the object(s) from the test video to interact with themselves. The experimenter was absent during the presentation of the videos and during the response phase; he only appeared briefly to bring and remove the test objects.

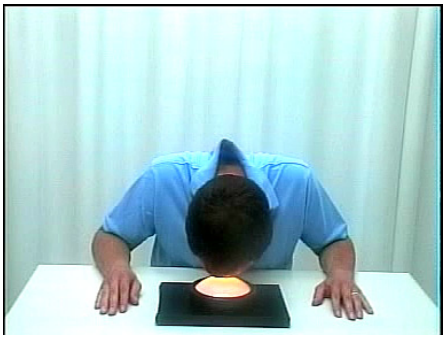
For both types of tasks, in the familiarization videos the model's group membership was expressed using language: Participants in the in-group condition were presented with videos of a model telling a story in the participants' native language (i.e., German). For participants in the out-group condition, the familiarization videos showed the same, bilingual model (who has spoken both languages since early childhood) telling a story with exactly the same content in a language participants had not heard before (i.e., Russian); see Figure 1a and the Appendix for one example in English of the stories used. There were four stories following the same structure, but differing according to the protagonist (cat, duck, owl, and elephant) and the location (farmhouse, pond, forest, and zoo). The intonation and prosody of the model's voice and his facial expressions were matched across conditions. The order of the four stories and the pairing of the stories with the different tasks were counterbalanced. All familiarization videos had a duration of approximately 30 s. At the beginning of each of the familiarization and test videos in both conditions, an attention-getter was presented on the screen: A picture of a smiling sun (with eyes) appeared and infants heard a friendly musical or beeping sound for 2 s. Note that all actions in all videos in both conditions were demonstrated by the same bilingual male model (who was a different person from the experimenter). After watching each of the familiarization videos, infants watched a test video from one of the two types of tasks.

Imitation tasks. In each imitation test video, the model first looked at the camera with a neutral facial expression, then silently used an unusual novel action to turn on a lamp, then looked back up to the camera neutrally. In the head-touch task, the model touched his forehead to the lamp three times, illuminating the lamp briefly each time (as in Meltzoff, 1988; see Figure 1b). His hands rested naturally on the table next to the lamp. In the sit-touch task, the model sat three times on the box, illuminating the lamps briefly each time (as in Buttelmann et al., 2007).

As soon as the test video ended, the experimenter entered the room, placed the apparatus from the video either on the table (head-touch) or the floor (sit-touch), told infants, "Now you can play with it!," and left the room. The length of the response period varied by task based on pilot results indicating differing interest and difficulty levels for the two apparatuses (i.e., infants were willing to interact longer with the sit-touch box because they could move around freely, and they often took longer to manage to achieve the novel action in that task as well). The response period was 60 s for the head-touch task and 120 s for the sit-touch task, starting from the moment infants first touched the apparatus.

a)

b)



c)

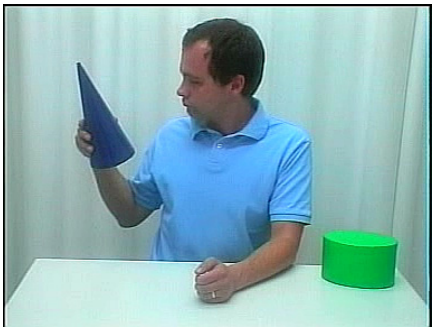


Figure 1. (a) The model telling a story in the familiarization phase, in participants' native language (German, here shown in English; in-group condition), or in a language participants had never heard before (Russian; out-group condition). (b) The model illuminating the head-touch lamp. (c) The model choosing one of two novel objects in the preference task.

Preference tasks. Each preference test video consisted of the model silently choosing one of two novel objects (as in Thomas, Due, & Wigger, 1987). In each of these test videos, the model first looked at the camera with a neutral facial expression, then looked at each of the two objects in turn (in counterbalanced order), and then chose one of the objects by picking it up and looking at it from different angles with a happy, satisfied facial expression while nodding his head (see Figure 1c). He then held it up to his cheek, caressed the object, and looked back at the camera. The object the model chose and the side of the chosen object were counterbalanced across participants. As soon as the test video ended, the experimenter entered the room, placed a tray with both the objects previously shown in the video on it (on the same sides as in the video, approximately 30 cm apart) on the table in front of infants. He then told infants, "Now it's your turn!" and left the room. Because infants normally responded very quickly, they were given 30 s to choose one of the two objects. All of infants' responses were videotaped

Coding and Analyses

Infants' behavior was coded from the videotapes by an observer who was unaware of the experimental condition infants were in. In the imitation tasks, infants were scored as having copied the head-touch action if they touched the lamp with their head, and as having copied the sit-touch action if they sat on the box (or attempted to do so by putting one knee on it) at any point during the response period. In the preference tasks, the object infants touched first was coded. For the imitation and the preference tasks separately, infants received a score from 0 to 2 for the number of tasks in which they copied the model's action or chose the same object he did. Because only infants who completed all four trials (two in the imitation, and two in the preference task) were included in the final sample, the data set consisted of 264 trials. However, the general pattern of results did not change if the infants who did not complete all four trials were also included in analyses. Finally, to see whether infants paid the same amount of attention to the videos in each condition we also coded the time infants spent looking at the familiarization and test videos for each task.

A second, independent observer coded 100% of the trials, also blind to condition. Interobserver agreement was excellent: Cohen's αs = .90 for the imitation tasks and 1.00 for the preference tasks. Two-tailed p values are reported throughout.

Results

In the imitation tasks, as expected, infants in the in-group condition were more likely to imitate the unusual novel action (43.9% of trials; *SD* = 34.8%) than infants in the out-group condition (25.8% of trials; *SD* = 30.9%), Mann–Whitney *U* = 390.5, *N*(in-group) = 33, *N*(out-group) = 33, $p = .03$. Similar results were found for each imitation task separately. In the head-touch task, 46% of infants imitated in the in-group condition compared to 21% in the out-group condition, and in the sit-touch task, 42% of infants imitated in the in-group condition compared to 30% in the out-group condition; however, this was only a statistically significant difference for the head-touch task, $\chi^2(1, N = 66) = 4.36$, $p = .04$, not the sit-touch task, $\chi^2(1, N = 66) = 1.05$, $p = .31$.

It is important to note that in both imitation tasks, all infants in both conditions succeeded in turning on the lamp, if not by copying the model's unusual action then by using their hands. Thus, infants in both conditions were equally interested in the apparatuses and involved in the tasks, but infants in the in-group condition copied the model's unusual action—how he turned on the lamps—more faithfully than infants in the out-group condition.

In the preference tasks, in contrast, infants' choice of the same object the model chose did not differ between conditions. Infants chose the same object as the model in 42.4% (*SD* = 35.6%) of trials in the in-group condition and 57.6% (*SD* = 35.6%) of trials in the out-group condition, Mann–Whitney *U* = 667.0, *N* = 66, $p = .09$. In both conditions, infants' choices did not differ from chance level (Wilcoxon tests, in-group condition, $Z = 1.21$, $N = 33$, $p = .23$; out-group condition, $Z = 1.21$, $N = 33$, $p = .23$). As a group of infants did not have a clear preference for either of the objects in the pair: Binominal tests revealed that infants chose the two objects equally often (blue-green task: 48% vs. 52% of infants, respectively, $p = .90$; pink-yellow task: 39% vs. 61% of infants, respectively, $p = .11$).

The order of presentation of the two types of tasks (imitation tasks first vs. preference tasks first) did not influence the results of either task, Mann–Whitney *U* tests, both $ps \geq .28$.

With regard to infants' attention to the videos, the percentages of time infants spent looking at the familiarization videos ranged from 56.2% to 63.7% (*SD*s = 11.9%–15.6%) for each task in each condition. The percentages of time infants spent looking at the test videos in the imitation task were 95.3% (*SD* = 9.3%) in the in-group condition and 97.1% (*SD* = 5.3%) in the out-group condition. For the preference task these percentages were 90.4% (*SD* = 10.3%) and 92.3% (*SD* = 9.0%), respectively. A 2 (task: imitation, preference) × 2 (condition: in-group, out-group) × 2 (phase: familiarization, test) repeated measures analysis of variance (ANOVA) was performed on the percentage of infants' looking times. There was no main effect of condition, $F(1, 58) = 1.03$, $p = .31$, indicating that infants were equally attentive during the presentation of videos in the in-group condition ($M = 79.2\%$, $SD = 9.9\%$) and out-group condition ($M = 75.8\%$, $SD = 8.4\%$). There was a significant interaction between type of task and phase, $F(1, 58) = 9.92$, $p = .003$, which revealed that infants looked less during the test phase in the preference tasks ($M = 91.3\%$, $SD = 9.6\%$) than the imitation tasks ($M = 96.2\%$, $SD = 7.6\%$). There was also a significant Condition × Phase interaction, $F(1, 58) = 8.45$, $p = .005$, which showed that infants looked less during the familiarization phase in the out-group condition ($M = 56.9\%$, $SD = 12.5\%$) than in the in-group condition ($M = 63.4\%$, $SD = 12.4\%$). Furthermore, infants looked less during the familiarization phase ($M = 60.0\%$, $SD = 12.8\%$) than during the test phase ($M = 93.8\%$, $SD = 7.7\%$) in both tasks, $F(1, 58) = 519.68$, $p < .001$. They also looked less during the preference tasks ($M = 76.4\%$, $SD = 10.4\%$) than the imitation tasks ($M = 78.6\%$, $SD = 11.8\%$) across conditions, $F(1, 58) = 4.55$, $p = .037$. Although there were no differences between conditions in infants' looking at the test videos, we additionally tested whether there was a correlation between infants' looking time during the familiarization videos of the imitation tasks and infants' imitation scores. No such correlation was found, Spearman correlation, $N = 62$, $rs = -.128$, $p = .32$.

Discussion

People eat, dress, speak, and perform cultural rituals all over the world; it is *how* they do these things that differs across cultures (Nielsen, 2009). Similarities within cultural groups and differences across cultures could either result from some automatic, general tendency of children to copy others faithfully (e.g., Csibra & Gergely, 2006; Lyons et al., 2007; Whiten et al., 2009)—because children are typically surrounded by in-group members—or else they could result from a more deeply social desire to do things the way one's group members do them. The current study supports the latter view. Infants did not copy indiscriminately; instead, they imitated a novel, causally opaque action more often

when the model appeared to be an in-group member than when he appeared to be an out-group member. To deal with these results, automatic imitation accounts would have to add the provision that the model is an in-group member (see Lyons et al., 2007, for a series of other provisions that need to be added to these accounts for them to be able to begin to explain the flexibility of children's imitation). In any case, infants are influenced by the group membership of those who demonstrate things to them. By 14 months, they have begun to participate in truly cultural learning, copying in-group members more faithfully than out-group members.

In contrast to the tasks involving imitation of unusual novel actions, in the tasks involving adoption of the model's preferences, infants did not systematically differ in their object choice in the in-group and out-group condition. Whereas this is somewhat surprising given our finding of selective copying of the in-group model in the imitation task, it does fit well into the bigger picture of mixed results concerning infants' sensitivity to others' preferences (see, e.g., Buresh & Woodward, 2007; Gergely et al., 2007; Repacholi & Gopnik, 1997; Zmyj et al., 2010). It could simply be that infants saw the adult's preference as individual and subjective, and thus it did not occur to them to copy it. The fact that infants did not even copy the adult's choice of objects in the in-group condition lends support to this idea.

Although infants did copy the model more closely in the in-group condition than the out-group condition in the imitation tasks, it is too early to say on what basis they did so. The finding that infants imitated differentially had to be related to the language the model spoke, as that was the only methodological difference between conditions. Yet, in this study as well as in other studies using similar procedures, whether infants saw that language as an indicator of the model's group membership at some level, or whether instead they reacted on a more individual level, on the basis of something like unfamiliarity with the out-group language, or a feeling of dissimilarity with the out-group model ("this guy is not like me"), or linguistic comprehension ("I do not understand this guy"), is not clear. Familiarity, similarity, and comprehension all are typically linked to group membership, so they can serve as the foundation for future, more complex understanding. Future research is needed to determine what level of understanding 14-month-olds have (although note that even in the literature on adults, the issue of to what extent group cognition involves reasoning on the basis of individuals vs. groups is a topic of long-standing debate; see, e.g., Postmes, Haslam, & Swaab, 2005, for a discussion of the idea that both are important). For example, future studies could attempt to use minimal group manipulations in which familiarity, language, and many other variables are controlled across the in- and out-group members (see, e.g., Dunham, Baron, & Carey, 2011; Over & Carpenter, 2012, for use of the minimal group paradigm with 3- to 6-year-olds). It might be that only older children would be capable of showing this effect when those variables have been controlled.

Either way, it is not the case that infants simply paid less attention to the out-group model and copied him less for that reason. Not only did infants pay equal amounts of attention in both conditions when watching the test videos but infants in the out-group condition clearly learned something from the model's demonstration. All infants in this condition learned to illuminate the lamps; they just were less likely to do so in the unusual way demonstrated by the model. Infants copied the out-group member less even in a between-subjects design, with no contrasting in-group member present (unlike in, e.g., Kinzler and colleagues' studies).

Infants' selective imitation of the in-group model suggests that by 14 months of age, infants use a model's group-relevant characteristics to guide their own imitative responses. Infants around their first birthdays do not copy actions they see performed by others indiscriminately; instead, they are starting to selectively acquire the characteristics and specifics of their own cultural group via social learning from very early in ontogeny.

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Appendix

One of the four stories in English.

"Hello little one! How are you? I am going to tell you a story, and it goes like this: A duckling lived near a pond. One day, the duckling went on a journey to find other animals. After a long walk the duckling met a cat. "Hello cat!" said the duckling, "Your fur is really soft! Come on, show me where you live!" And they both went to the farmer's house."