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The role of shared cultural knowledge in young children’s social categorization processes

Theses of Doctoral (PhD) Dissertation

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INTRODUCTION

The success of the human race is largely attributable to the unique form of group living that fosters the formation and preservation of shared cultural knowledge (Hermann, Call, Hernandez-Lloreda, Hare & Tomasello, 2007). Given the complex structure of human societies that is made up of multiple, often overlapping, social groups and categories, successful navigation of social behavior depends on a general understanding of how these groups are organized (Kinzler & Spelke, 2007). Evidence from developmental psychology suggests that even young children are sensitive to at least a few selected social categories, such as sex (e.g. Quinn, Yahr, Kuhn, Slater & Pascalis, 2002), age (e.g. Bahrick, Netto & Hernandez-Keif, 1998) or language (e.g. Kinzler, Dupoux & Spelke, 2007, see below). In the past years, numerous studies have shown that social group membership as indicated by language is one of the most efficient cues in guiding social preferences and interactions from only a few months of age (Kinzler et al., 2007; Kinzler, Dupoux & Spelke, 2012; Shutts, Kinzler, McKee & Spelke, 2009; Kinzler, Corriveau & Harris, 2011; Lieberman, Woodward & Kinzler, 2017; Begus, Gliga & Southgate, 2016). Moreover, social categories based on language seem to hold a special relevance for adults as well, as linguistic group membership is more readily encoded than racial categories, for example (Pietraszewski & Schwartz, 2014).

We propose that language cues are so powerful in activating social category representations because they provide a direct cue about the most important information that can be derived from group membership for humans. A fundamental characteristic of human sociality is the establishment and preservation of cultural practices that foster the cohesion of social groups and that prescribes behavior in many aspects. Cumulative cultural evolution has led to significant variations among social groups in the scope of adaptive behavioral patterns that support survival in a particular environment (Boyd & Richerson, 2005). The success of the individual in a social environment depends largely on familiarity with these cultural practices or norms (shared cultural knowledge) and on the accurate detection of the borders of the norms’ validity. Language is one piece of shared cultural knowledge, thus provides a good cue as to whether another individual belongs to the same cultural group.

Another challenge that follows from such a form of group living is that these specific behavioral patterns and knowledge have to be transmitted through generations with the help of adaptive social learning mechanisms (Boyd, Richerson & Henrich, 2011). Our proposition
is that social categorization and social learning operate in an intertwined manner in realizing this. On their way to becoming competent members of a given society, children should not only favor informants that are confident or experienced in general, but that possess knowledge that is valid in the specific social environment they grow up in. In other words, novices should be prepared to selectively endorse information coming from members of their own social group („in-groups“). A handful of studies have already confirmed that young children indeed show selectivity based on group membership. Buttelmann, Zmyj, Daum and Carpenter (2013) have shown that infants as young as 14-month-old selectively imitate linguistic in-group members over people speaking in a foreign language. Howard, Henderson, Carrazza and Woodward (2015) reported similar findings with 19-month-old and 3-year-old children with the constraint that the younger age group only showed selectivity when the potential informants were presented on video.

The studies presented in the dissertation were designed to test two main predictions following from this reasoning.

**THESES**

1. If the human mind is indeed wired to detect the boundaries of shared cultural knowledge, then language should not be the only cue to guide social preferences and categorization processes. Other cues that signal the same cultural background should evoke similar effects. Our proposition is that conventionality of tool-using behavior could be an early emerging signal for children as it inherently has a cultural aspect and children rapidly learn about the normative functions of objects from a young age (Casler & Kelemen, 2005). We explore this question in Studies 1 and 2. Moreover, adults should also be sensitive to cues that indicate a common cultural background; this hypothesis is tested in Study 5.

2. Category-cues should be used to guide selective social learning. Children should be more willing to accept information coming from “in-group” members than “out-group” members, since the latter source may be seen as less reliable in providing culture-relevant knowledge. Moreover, these selection processes should be especially apparent when it comes to generic knowledge. This prediction is tested in Studies 2, 3 and 4.
STUDY 1

Study 1 was designed to test whether young children would take cues of sharing knowledge other than spoken language as indications of group membership and would use these cues to make inferences about the other characteristics of an individual.

Methods

2-year old children (range: 20-28 months) first watched videos depicting a male model perform three goal-directed actions consistently either in a conventional or in a non-conventional way, in a between-subjects design. Participants were presented with the same set-up in both the Conventional and the Non-conventional condition, where two tools and two potential goal-objects were present. The model used the same tool in both conditions; however, while in the Conventional condition the goals were traditionally associated with the tool (e.g. a pair of scissors used to cut paper), the goals chosen by the model in the Non-conventional condition could always be seen as a violation of social norms (e.g. using a pair of scissors to cut banana). In the test phase, children were presented with photographs taken of the model and of a similarly aged unfamiliar person while listening to a foreign (Experiment 1, n=30) or a native language (Experiment 2, n=26) text. We coded who children associated the native or the foreign language with as indicated by the direction of their first gaze upon hearing the text.

Results

Upon hearing the foreign utterance, children looked at the model first if he had been seen to act in an unconventional way during familiarization. In contrast, children looked at the other person if the model had performed conventional tool using actions ($\chi^2(1)= 4.821, p = 0.028$). No such differences were found in the case of the native language ($\chi^2(1)= 0.16, p = 0.69$). The results suggest that children take the conventionality of behavior into account in forming representations about a person, and they generalize to other qualities of the person based on this information.
STUDY 2

This study investigated whether toddlers would selectively imitate a demonstrator who exhibits familiarity with cultural practices in their tool-using habits over a demonstrator who consistently uses tools in an unconventional way.

Methods

45 3-year-old children participated in the study. Participants first watched videos depicting two models, one of whom performed too-using actions in a conventional way, while the other model deviated from social conventions. Then, both models introduced a technique of how to build a tower from Lego bricks, differing in one element of the process. Moreover, the context of the demonstration was also manipulated: in the Ostentsive condition (n=21), the models expressed their teaching intentions, while in the Non-ostensive condition (n=24), they performed the actions without communicative signals. In the end, children had an opportunity to build the tower themselves.

Results

We coded whether children would be more likely to copy the method of the conventional tool-user or the non-conventional tool-user. Since a number of children came up
with alternative solutions, we performed two analyses: one included children that introduced their own novel methods and one included only those participants that followed either of the models. In both analyses, we found that children were more willing to copy the actions of the conventionally behaving model, irrespective of the context of the demonstration (All participants: Z=2.311; p<0.001, Excluding alternative solutions: p=0.001 [binomial]; see Figure 2.)

**Figure 2.** Number of children imitating the variants introduced by the two models in the Ostensive and the Non-ostensive conditions (left: including alternative solutions, right: excluding alternative solutions).

**STUDY 3**

The present study investigated 3-year-old children’s learning processes about object functions. We tested how children would generalize functions to a kind of objects based on whether the source of the information was an in-group or an out-group member. Artifact functions are socially determined and thus, generalization of functions from a single observation to a category of objects should only happen if the teacher is seen as a reliable source of generic cultural information.
Methods

We built on children’s tendency to commit scale errors with tools to explore whether they would selectively endorse object functions from a linguistic in-group over an out-group model. 37 3-year-old children participated in the study, of which 17 were assigned in the Native and 20 in the Foreign Condition. Participants were presented with different object sets (3 in total), and a model speaking either in their native or a foreign language demonstrated how to use the presented tools. In the test phase, children received the object sets with two modifications: the original tool was replaced by one that was too big to achieve the goal but was otherwise identical, and another tool was added to the set that looked different but was appropriately scaled for goal attainment.

Results

Children in the Native condition were significantly more likely to commit scale errors – that is, choose the over-sized tool – than children in the Foreign condition (48 vs. 30%; F(1, 101) = 4.024; p=0.048). We propose that these results provide insight into the characteristics of human-specific learning processes by showing that children are more likely to generalize object functions to a category of artifacts following a demonstration from an in-group member.

Figure 3. Average ratio of committing the scale error in the two conditions.
STUDY 4

Study 4 was designed to test whether epistemic trust could be extended to speakers of a foreign language by familiarizing children to the given language. We also tested whether any potential positive effect of familiarity with a foreign language would result in a general openness to non-native speakers or it would be restricted to the familiarized language.

Methods

62 children, aged 43-52 months (M=48 months) participated in an imitation study that was preceded by a familiarization phase. The process of familiarization was carried out in the course of four days with the help of children’s cartoons and songs. In a between-subjects design, 4 conditions were created based on the language of the familiarization and the language the model spoke during the test phase. Two of the conditions included familiarization with a foreign language (Czech), while in the other two conditions, we used songs and cartoons in the children's native language during familiarization (Hungarian). In the test phase, children who participated in the Hungarian familiarization either saw a Czech (non-familiar foreign) or a Hungarian (native) speaking model perform a simple action (switching on a lamp with their forehead instead of using their hands, see Meltzoff, 1988), while those who were familiarized with the foreign language were either faced with a Czech (familiarized foreign) or a Swedish (non-familiar novel language) speaking model. After the demonstration, children had the opportunity to operate the lamp themselves.

Results

The results show that children were just as likely to imitate the foreign language speaking model as the native model if they had previously been familiarized with the language ($G^2(2)=13.48; \ p=0.001$). A low imitation rate in the Czech-Swedish condition suggests that the effect was restricted to the familiarized language and that familiarization did not result in a general acceptance of teachers speaking in foreign languages.
Figure 13. Occurrence of response types (head-touch vs. hand) in the different conditions.

STUDY 5

The present study investigated whether adults rely on cues of shared cultural knowledge when forming category representations of fellow humans.

Methods

The study used a modified version of the memory confusion paradigm (Taylor, Fiske, Etcoff & Ruderman, 1978), where participants are presented with photographs of people differing along a certain social category distinction while listening to utterances associated with the pictures. In the test phase, the task is to match each utterance to the person whose picture it was associated with. When category representations are formed along a certain distinction, more within-group than between-groups errors are expected. Experiment 1 (n=49) contrasted the use of two possible cues in social category representations: race and
shared cultural knowledge. Participants were presented with pictures depicting six people belonging to two different ethnicities based on skin color, while the utterances included statements that showed whether the person was familiar with cultural practices specific to the participants’ society. Moreover, in the second part of the demonstration, we also included neutral sentences that carried no information about cultural group membership. This was added to see whether category representations of cultural background would be active during the encoding of otherwise neutral sentences. In Experiment 2 (n=31), race as a potential basis for social categorization was removed and the only distinction available was based on the content of the utterances.

**Results**

In both experiments, analyses showed that participants made more within-group (WG) than between-groups (BG) errors based on cultural knowledge when we included all of the sentences in the analyses (Experiment 1: \(t(48)=-2.206; p=0.032\); Experiment 2: \(t(31)=6.471; p<0.001\)). However, we found no such result when only the sentences with neutral content (test sentences) were included (Experiment 1: \(t(48)=0.518; p=0.607\); Experiment 2: \(t(31)=0.372; p=0.712\)) thus the sentences did not provide a cue of group membership at recall (Figure 5 depicts the results from Experiment 2). Interestingly, we found no clear evidence of racial categorization when race was pitted against cultural knowledge in Experiment 1. These results suggest that people form representations of groups based on perceived similarity in cultural knowledge and that racial cues may seem irrelevant in the face of cues of shared knowledge.

![Graph showing number of errors for WG and BG](image-url)
GENERAL DISCUSSION

In the dissertation, I argue that one of the key functions of sorting fellow humans into categories or representing groups is that it helps identify whether another person shares cultural knowledge with oneself and consequently, especially for children, whether one can bestow epistemic trust upon them and learn from them. Relatedly, I have also argued that if evolutionary forces have driven the development of the cognitive faculty responsible for social categorization in this manner, then cues that are indicative of shared knowledge should trigger this process.

Study 1 was designed to address the question whether tool-use and language-use are represented in a coherent manner. Our hypothesis was that if children treat both types of behavior as a manifestation of shared knowledge then they would form some kind of connection between these two facets of behavior. The study provided evidence that violations of social conventions in using familiar tools are associated with unfamiliar language use in the representations of 2-year-old children. Next, in Study 2, our aim was to test whether children would show similar selectivity in their learning processes based on tool-use as they do based on language-use. In this study, we also added another variable that has a defining role in cultural-learning: the ostensiveness of the context (see the Natural Pedagogy theory, Csibra & Gergely, 2006; 2009). Our results showed strong selectivity based on the tool-using habits of the model, but this effect was not modulated by whether the demonstration was communicative or not. This implies that 3-year-old children first identify the circle of potential teachers and are unwilling to learn from someone outside this circle even if the person expresses their intention to pass on information. Study 3 was designed to investigate the mechanisms through which cultural knowledge is transmitted. Building on the phenomenon of scale error, we showed that 3-year-old children treat artifact functions as culturally fixed only when the initial demonstration of the function was presented by a linguistic in-group member. Thus, the linguistic group membership of a person defines their competence regarding other cultural phenomena, such as tool-functions. These results also fit
well with the genericity bias described in the theory of Natural Pedagogy (Csibra & Gergely, 2006; 2009): when information is presented by a cultural in-group member, children apply the expectation that the information is not restricted to one exemplar but to other tools that are perceived to be of the same kind. Study 4 explored the question of how the epistemic trust formed on the basis of cues implying shared culture (in this particular study, language) are extended. Here we showed that even short-term familiarity with a language evokes epistemic trust in a person speaking that language (but not other foreign languages). We propose that this extension of trust can be attributed to the fact that the foreign language was introduced by cultural in-group members and in a quasi-teaching scenario. The last study shifted the focus of investigation to the adult population. Using the memory confusion paradigm (Taylor et al., 1978) we investigated whether adults form category-representations based on shared knowledge (indicated by eating habits). Our results show less conclusive evidence about the strength of these representations but nonetheless suggest that these categories are formed and when contrasted with race, have the power to diminish the significance of that distinction.

Thus, our general conclusion is that perceived correspondence between knowledge bases is an important factor in person perception and possibly categorization. Social categorization or social preferences based on shared cultural knowledge has a unique importance for human cooperation. The peculiarity of human cooperation lies in our tendency and ability to engage in large-scale cooperative acts that do not (only) rely on interpersonal interactions but on institutionalized cultural norms (Henrich, 2004). These include our ability to navigate in traffic with our car but also our ability to exploit the benefits of labor division. All of these rely on the assumption of a shared representational space where one not only expects the other person to be in possession of the same piece of knowledge as oneself but also expects the other person to think the same about the shared nature of the information.

The most important prerequisite to creating such a shared representational space is the presence of special learning mechanisms that enable the accumulation of cultural knowledge (Boyd & Richerson, 1996). One important criterion of such a learning mechanism is to allow for the generalization of knowledge (Csibra & Gergely, 2006). Another one is to adequately place the boundaries of these generalizations. We have proposed that social categorization helps achieve this latter criterion. Our results that different cues of shared knowledge effectively guide selection processes in social learning support this idea. These results also corroborate previous findings showing selective imitation based on the linguistic group membership of the teacher (Buttelmann et al., 2013; Howard et al., 2015).
Importantly, however, it has to be acknowledged that at present, we do not have enough evidence to postulate whether the mental processes underlying the behavior of our participants in these studies fit the criteria of “categorization”. Moreover, we would like to emphasize that while we propagate the idea that person perception based on shared knowledge explains an important and pervasive facet of phenomena, it is not a unifying account of what is generally considered “social categorization”. First of all, category representations do not always map onto actual “groups” – that is, a circle of people that are involved in any kind of interactions. Categories, such as sex, age or even “blonds”, etc. need not be viewed as ones corresponding to any conglomerate of people who engage in some joint activity at any time. Thus, these have to operate in a different way than how we interpret the findings from the studies in the dissertation.

Moreover, when it comes to categories mapping onto actual groups, different accounts on the nature of category representations have been proposed. Rhodes and Chalik (2013), for example, claim that social categories mark interpersonal obligations: category boundaries define how people will relate to each other (whether it is expected that people will protect or harm each other). An alternative, but not completely unrelated, view claims that detecting coalitional allegiances drives categorization (Kurzban, Tooby & Cosmides, 2001). An account we would propose is that the detection of coalitions and shared knowledge are actually interrelated: the function of monitoring whether we share knowledge with another individual is that it will give us information about the range of interactions we can conduct with them, including whether the person is a reliable source of information and whether there is even the possibility of cooperation with the person (besides their willingness). Diverse knowledge bases would make it extremely difficult to communicate and thus to cooperate.

In conclusion, while all of the phenomena described above are usually somehow fitted into the concept of “categorization”, the functions and underlying mechanism are probably very diverse. The argument we would like to defend is that sorting people into groups and social learning interweave in that humans have an early emerging sensitivity to similarities in epistemic states and a tendency to trust those that possess shared knowledge. We also suggest that it is supposedly a consequence of an evolutionary adaptation that makes cumulative cultural evolution possible.
References


