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DOCTORAL SCHOOL OF PSYCHOLOGY
COGNITIVE PSYCHOLOGY PROGRAM

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**Language based social categorization plays an important role in children's selective
social learning mechanisms**

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Budapest, 2021

Introduction

Living in a social environment is not a peculiarity of the human kind, but humans stand out by creating cultures with complex, commonly accepted and followed rules and norms. Furthermore, humans are able not only to create these cultures but also to maintain it from generation to generation over many years (Boyd, Richerson és Henrich, 2011). For these processes, we need our ability to recognise the boundaries between different social groups and the ability to recognise the reliable sources of specific information. Based on recent developmental psychology research it seems that very small children already possess these abilities.

Among the social keys for the discrimination of people from each other, there are clearly four essential social categories. Few months old infants tend to differentiate people based on sex, age, race and spoken language (Miller, 1983; Bahrick, Netto és Hernandez-Reif, 1998; Kelly, Quinn, Slater, Lee, Gibson and Smith, 2005; Mehler, Jusczyk, Lambertz, Halsted, Bertoni és Amiel, 1988). The social keys can also affect children's behavior, thus it seems that these are important social factors for children that influence their learning mechanisms as well (Kinzler, Woodward, Sullivan és Kinzler, 2016; Rakoczy, Hamann, Warneken és Tomasello, 2010). At the same time, research in recent years has shown that spoken language can play a dominant role in social categorization. Spoken language is not only a cue to differentiate between people, but also affects children's learning processes, and even less than a year olds believe that those who speak one language should share other important common traits as well. Liberman and his colleagues reported that children expect people who speak the same language to affiliate with each other (Liberman, Woodward and Kinzler, 2016) and to prefer the same food (Liberman, Woodward, Sullivan és Kinzler, 2016). Recent developmental psychology results suggest that for children, spoken language can be outstanding not only to recognise who belongs to which social group, but also to detect the potential knowledge of people and the boundaries between the content of group knowledge (Oláh, Elekes, Bródy and Király, 2014; Soley and Spelke, 2016).

Recognizing knowledge boundary can be especially important during learning. Children selectively learn from people (Gergely, Bekkering and Király, 2002), they especially prefer to learn from the reliable sources. For example, they are prone to learn the name of an object from someone who has correctly named an object in the past, as opposed to someone who has

already made a mistake in this area. (Birch, Vauthier and Bloom, 2008). Selective learning mechanisms help children designate people from whom they can get genuinely reliable and correct knowledge.

The present dissertation argues that social categorization plays an important role in children's selective learning mechanisms by helping to designate the reliable sources of information of the knowledge of a particular group.

In cultural learning, this selective learning mechanism can be particularly important, since the cultural knowledge system is often made up of arbitrary, culture-specific information that cannot be explained rationally. For example, there is no difference in quality between chopsticks and forks, but learning how to use the right tools is important in every culture. Children have to learn what and how should they do for being a good member of their specific in-group. Buttelmann and his colleagues (2013) demonstrated that children were more willing to imitate a strange behaviour if the model previously spoke their native language, as opposed to a foreign one (Buttelmann, Zmyj, Daum and Carpenter, 2013).

The above mentioned theoretical frames prove the assumption that language has a prominent role in social categorization because it helps to assign native speakers who presumably belong to our own cultural group and thus possess the culture specific knowledge that should be learned by all the group members. Three empirical studies are presented in the dissertation to confirm the so-called culturally shared knowledge theory. In the second half of the dissertation, proposals are formulated to complement practical methods for preventing the negative aspects of social categorization within the frames of the new theory.

Theses

1. The culturally shared knowledge theory states that social categorization helps children's learning mechanism by assigning the reliable sources of the culture-specific information. In view of this, it is expected that children would learn culture-specific knowledge only from someone who is certainly a member of the cultural in-group and is therefore familiar with the norms and rules of that specific culture.
Experiment 1 was created to shed light on this assumption. We used language to demonstrate culturally in- and out-group members and used tool-function mappings for demonstrating culture specific knowledge content.
2. If language based social categorization indeed reflects a knowledge base differentiation, it can also be assumed that children expect native speakers to share other aspects of the cultural specific knowledge as well. This expectation would allow children to treat all persons speaking their native language as an equally reliable source of information when learning culture specific knowledge. In the second empirical research we examined whether two-year-olds expect native speakers to use the same tool for the same purpose or not.
3. In the light of the culturally shared knowledge theory, children do not necessarily form preliminary expectations toward the knowledge content of foreign speakers. Those who speak a foreign language are assumed to be members of another, unknown culture and in the absence of any other information children may suspend these expectations for unfamiliar out-groups. Experiment 3 aims to test this hypotheses.
4. With the help of 3 experiments we provided proof for the idea that social categorization has an epistemic function in early childhood and facilitates children's learning mechanism. At the same time, in everyday life, the negative side of social categorization (e.g. prejudice, discrimination) becomes more dominant. In the second part of the dissertation several proposals are formulated with the help of the results of recent developmental psychology research. These new perspectives may complement the practical methodology in preventing negative outcomes of social categorization.

Experiment I

In the first study, we tested whether children learn culture-specific information only from someone who was certainly a member of their cultural in-group. We used native and foreign language to demonstrate cultural background. Culture-specific knowledge was introduced to children through tool-function mapping. An object can be effective in many situation, it is the culture that empowers an object with a particular function. In the course of the methodology, we relied on the principle of the so-called teleo-functional theory (Casler and Kelemen, 2005, 2007), which states that children (like adults) treat the function as an enduring property of a tool and therefore use a tool for a certain purpose and prefer to use another one to achieve a new goal.

Method

The study involved 39 monolingual 4-year-olds (44-52 months) who saw four object-function demonstrations presented by a person who previously spoke the children's native or a foreign language. Children were randomly assigned to the native language (20 persons) or to the foreign language (19 persons) condition. After the four tool-function presentations, the model left the room and the test section followed in which the experimenter (who always spoke in the children's native language) came in. The experimenter put out new target objects which could be achieved by either the previously seen demonstrated tools or with a novel, alternative one. It is important that there was no difference in efficiency between the two tools. According to the teleo-functional principle we hypothesised that children should prefer to use the new tool for the new purpose if they learned the function of the demonstrated tool's function during the familiarization phase. We predicted that this would only happen in the native condition, since children learn the culture specific function from a native speaker, while children taking part in the foreign condition would choose randomly in the test phase.

Results

In each case the children's first choice was encoded. A choice was not only to touch the tool, but also to try to achieve the current goal, but it did not matter whether the goal was actually accomplished successfully or not.

Our results showed that a significantly higher number of children in native condition chose the alternative new tool to achieve the new goal ($F(1, 131) = 5,398, p = 0.022, R^2 = 0.432$) (figure 1). The choices of children in the foreign language condition did not differ from random selection ($t = -1.275, p = 0.20$), while the choices of children who took part in the native condition differed ($t = 2.435, p=0,017$).

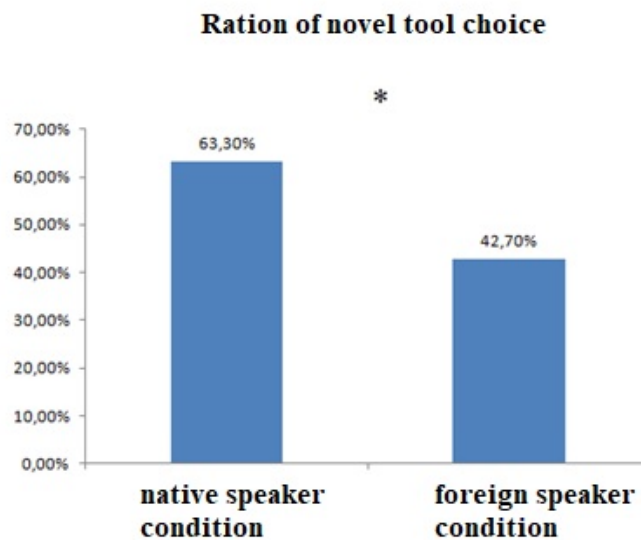


figure 1: Average ratios of alternative, novel tool choices.

We also analyzed the looking time data for the familiarization phase, for which no significant differences were found between the two groups ($t(10) = -0.797, p = 0.444$). Although children looked equally to the native and the foreign speaker's demonstration, they may did not pay attention equally to the two models. Random selection may have appeared because children did not encode the information that was presented by the foreign speaker model. A control experiment has been created to exclude this possibility.

Experiment I/2

The goal of this research was to obtain a more accurate picture of the previously demonstrated foreign condition and to rule out the possibility that children's tendency to choose randomly between the two tools was only because of attention deficit.

Method

28 monolingual 4-year-old children took part in the experiment. A slightly modified version of the method used in Experiment 1 was used. We created two conditions, a replication and a memory condition. During the replication condition (14 subjects) the foreign condition of experiment 1 was repeated but with another foreign language. In the memory condition (14 subjects), the familiarization phase was similar to the replication condition (which was also the same as the foreign language condition of experiment 1), however, the test part was changed. In the memory condition, the experimenter put out both the target object that was used in the familiarization phase and the new target object and put them in the two side of the table. After that she took the already seen demonstrated tool and the new, alternative tool and put them in the middle of the table and then asked the child "What did Olga do previously."

Results

In the replication condition we replicated the results that we got in experiment 1 foreign condition. Children in the replication condition also randomly chose between the two objects ($t(13) = -0.806$, $p = 0.435$). The results of the memory condition were significantly better than predicted by random selection ($t(13) = 9.282$, $p = < 0.0001$).

These results indicate that children in foreign language condition chose randomly between the two tools not because they did not pay attention to the presentation, but because they did not learn the mutually exclusive object-function mappings from the foreign language model.

Altogether the results of the Experiment 1 demonstrated that children pay attention, encode and recall information from native speakers and foreign speakers as well, but learn culture specific information only from native speakers. This result supports the theory of culturally shared knowledge by demonstrating that social categorization helps children to identify the reliable sources of culture specific knowledge content.

Experiment II

In the second study, we tested whether children expected native speakers to share culture-specific knowledge beyond the language itself. The culture-specific knowledge was also demonstrated by establishing object-function mappings.

Method

We utilized the expectation violation paradigm and developed an eye-tracker study. The research involved 30 monolingual 2 years old children, of whom 15 were randomly selected to the congruent and 15 to the incongruent conditions. During the experiment children sat on a parent's lap and watched a video lasting 1 minute and 4 seconds. During the video children saw two persons speaking either the children's native or a foreign language. Both of them, after saying two sentences, used a certain tool for slicing an apple. It was very important that the two persons used two different objects for the same purpose. The familiarization phase was followed by the test phase, in which a new native speaker person appeared, visibly holding an apple in her hand, then reached forward and confidently chose one of the two objects which was used by either of the previously appeared models during the presentation. In the congruent condition, the person in the test phase chose the same subject which was previously used by the native speaker person. In the incongruent condition, the person reached the object which was earlier used by the foreign speaker person. Based on the expectation violation paradigm, we assumed that children would look the incongruent condition longer after the model made her choice in the test phase.

Results

We analyzed children's looking time data and looking patterns after the model made her choice. Our results showed that children in the incongruent condition looked the scene significantly longer (9.54mp) after the model had chosen one of the tools, compared to children who took part in the congruent condition (6.54secs) ($U=54$, $p=0.015$) (figure 2).

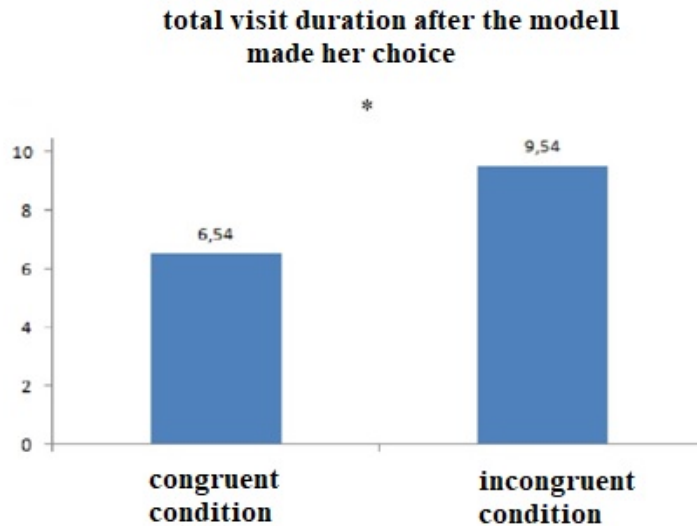


figure 2: children overall looking time data after the model made her choice in the two conditions.

In addition to the looking time data, we analyzed the indicator of visit count on the not-chosen tool, which represent the percentage of children who looked over the unselected object. This indicator also reflects children's disagreement with the model's choice. During the incongruent condition, 66.6% of children looked at the not-chosen object, compared with 13.3% of children in the congruent condition, which was a significant difference ($X^2(1)=8,889$, $p=0.003$; $OR=0.076$) (figure 3).

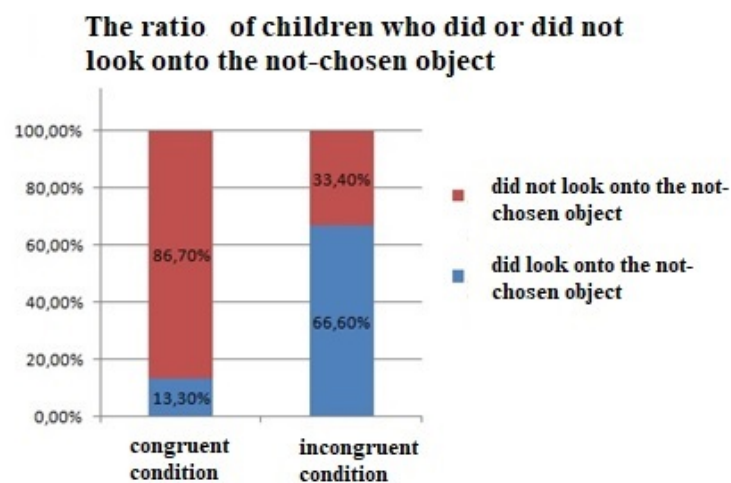


figure 3: The ratio of children who did look onto the not-chosen object in both conditions.

In the light of these results, children seem to expect native speakers to use the same tool for the same purpose. This expectation supports the theory of culturally shared knowledge, which claims that social categorization serves not only to distinguish between partners, but also to detect the boundaries of knowledge content.

Experiment III

In our third experiment, we tested the hypotheses that children may suspend their expectations toward foreign speakers culturally shared knowledge content. If spoken language and the shared knowledge it conveys are indeed based on a culturally common knowledge, it is conceivable that children will not form expectations toward unfamiliar foreign speakers' commonly shared knowledge, and would not expect them to use the same tool for the same purpose.

Method

In our third study, 30 monolingual two-year-olds participated, 14 of whom took part in the congruent and 16 took part in the incongruent condition. The procedure used in the research was the same as described in experiment II, with the only difference that the person in the test phase spoke the same foreign language (Russian) as the foreign person during the presentation.

Results

The procedure of data analysis was the same as the one we used in experiment 2. In the looking time data, after the model made her choice, there were no significant differences between the two conditions ($U=68.5$; $p=0.07$), participants in congruent condition watched the scene for an average of 7.47 seconds and participants in incongruent conditions watched the scene for an average of 8.5 seconds (figure 4). Although there was no significant difference,

the difference was not negligible. Therefore, we also ran a Bayesian independent sample t-test, which also testified that there was no significant difference between the two looking time indicators ($BF_{10} = 0.467$).

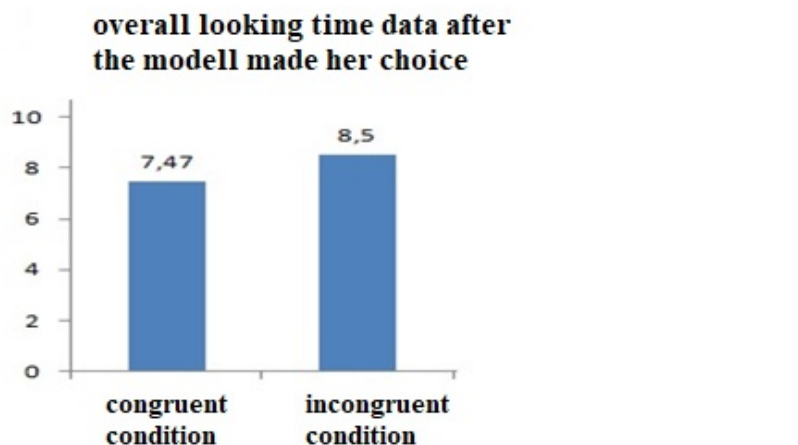


Figure 4: Overall looking time data after the model chose one of the two tools in the two conditions.

No significant differences were found between congruent and incongruent conditions regarding the other indicator of visit count ($X^2(1)=0.201$, $p=0.654$; $OR=0.7143$). In congruent condition 35.7% of children looked at the unselected object and 43.7% looked at it in incongruent condition (figure 5).

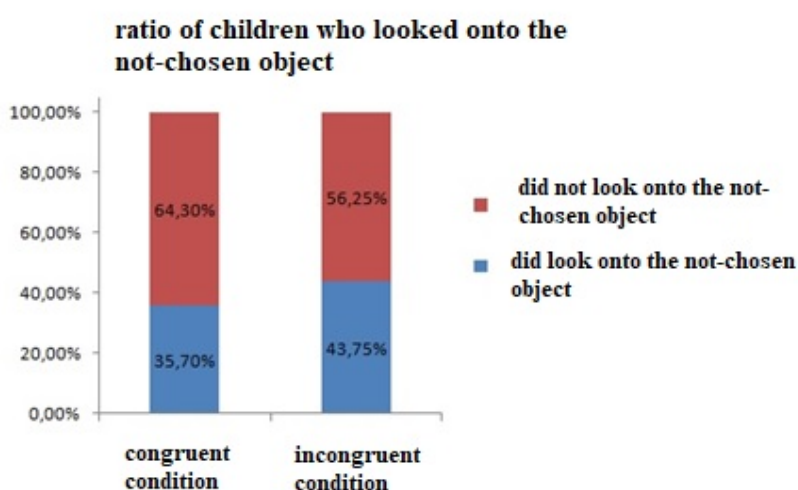


figure 5: The ratio of children who did or did not look onto the not-chosen object after the model made her choice in the two conditions.

These results show that children have not formed expectations regarding to foreign speakers tool's usage. Two years old did not expect foreign speakers to use the same tool for the same purpose. This result is interesting because previous research has reported that one year old children expect foreign speakers to prefer the same food and to affiliate with each other (Lieberman, et al., 2016). Our experiment demonstrated that it is feasible that children may form expectations about foreign speakers in domains that do not require specific knowledge (e.g.: preference of food, affiliation with each other) but they suspend to form expectations in the domain of culture specific knowledge content (e.g.: tool-function mappings). This result also suggests that children do not form their expectations on mere similarity. The principle of "similar people act alike" has not been supported by our results of experiment 3, which also indicates that our results in experiment 2, that children form expectations about native speakers, are not only due to the mere expectation of "similar people should behave in the same way".

Practical applicability of the theory of culturally shared knowledge

The theory of culturally shared knowledge highlights the positively beneficial function of social categorisation in adaptive learning mechanism. At the same time, in our everyday life, the negative consequences of social categorization appear more commonly, such as discrimination and prejudice. However, recent research in developmental psychology suggests that young children do not necessarily associate negative emotions with out-group members, the "other person" appears them rather as an uncertain person, but not necessarily a negative one.

The negative side of social categorization and the motivations behind them are known primarily from social psychology research, which usually focuses on prejudice and discrimination that are already associated with (negative) emotions. It was only in the 1980-90s when developmental psychology began to study the process of social categorization in childhood. Although young children cannot reliably report their emotions, their actions can tell us how they feel or what they think.

There is strong evidence that little babies are sensitive to certain social categories. Researchers using looking time paradigms demonstrated that even few months old infants are able to distinguish people based on sex, age, race and spoken language (e.g. Kelly, et al.,

2005). The procedure, used in these studies, is called looking preference, however, based on these methodologies we cannot talk about a real preference. Babies look longer not only at the favourite things, but also at the surprising, scary, new events (Bar-Haim, et al., 2006; LoBue and DeLeoache, 2009). Thus from their looking time data we can only conclude that they are naturally sensitive to paying attention to these basic social categories and are able to differentiate between people. However, older children, toddlers and preschool-age children may give us more detail of their thoughts and feelings due to their behavioural answers. Kinzler and her colleagues demonstrated that 10-month-old babies prefer to take a toy, and 2.5-year-olds prefer to give a toy to someone speaking their native language instead of someone speaking a foreign language (Kinzler, Dupoux and Spelke, 2007). However, there was no difference in similar behaviour in the same age groups when the adult person belonged to their own or another race (Kinzler and Spelke, 2011). Probably children prefer to give or accept a toy from someone who is more sympathetic to them, thus these studies have shown that for children under the age of three although language is an important indicator in this respect, race is not. However, in light of other research, linguistic categorization does not necessarily go hand in hand with negative emotions. There are studies which demonstrate that children pay attention and learn from foreign speakers as well as from native ones (Altinok, Hernik, Király and Gergely, 2020), which is interesting regarding to negative emotions, since emotions play an important role in learning and attention processes. Probably children pay less attention or they are less likely to learn from persons who give them some kind of negative feelings.

Buttelmann and Böhm (2014) used another type of methodology and demonstrated that negative attitude toward out-group members appears at around school age. In their study, children had to distribute things associated with positive (e.g. biscuits), negative (e.g. broken toys) or neutral emotions. They could decide to give them to their own group, to other group, or take it to the neutral place. The preference of the own group appeared in almost all children, but this did not necessarily go hand in hand with a deliberate negative attitude toward the out-group members. Six-year-olds were willing to place objects associated with negative emotions in a neutral place or give them to the other group, but eight-year-olds were more willing to give them to the other group. It seems that the in-group preference develops from an early age, but unlike previous views, this does not necessarily go hand in hand with necessarily negative feelings toward out-group members.

Developmental psychology research suggests that in preschool age and before that, the out-group members rather appear to be associated with neutral emotions and not with negative ones. If it is true then negative aspects of social categorization are more likely to develop only in school age and as a result of learning processes. Consequently intervention programmes for the prevention or mitigation of negative aspects of it might have particular importance.

The existing intervention programmes (in Hungary and abroad) are primarily aimed at stimulating meetings with external group members and deepening knowledge about external group members (Banks, 2001, 2003; Torgyik, 2008). The culturally shared knowledge theory, supported by empirical research, claims that social categorization's primary function lies in its epistemic function, which helps children to detect the reliable sources of information. Therefore it would be important to include factors in intervention methods that can help to override the differences between 'we' and 'they' by involving out-group members as reliable sources.

Practical proposals in the frames of the theory of culturally shared knowledge

Appearance of out-group members as experts within an institution

Within the frames of the theory of shared cultural knowledge, it seems that social categorization is important for children in order to assign the reliable sources of information from whom children should learn in order to be a “good” member of their own social group. Therefore, out-group members should be presented for children as reliable sources of information, as for example teachers in schools.

Appearance of out-group members as experts outside of an institution

Out-group members, as a reliable source of information, could also appear outside the institutional frames, which could be provided by tutorials or small group sessions (e.g. pottery, dancing).

Out-group members, as partners with whom someone can build the content of the commonlyshared knowledge

Thematic reading groups composed of minority and majority children may be helpful to create a commonly shared knowledge between in- and out-group members, which may contribute to break down the boundaries between “us” and “them”.

Parents and teachers as examples to follow

Although the role of peers will become more influential as the years go by, the role of parents and important teachers cannot be negligible. Consequently an effective intervention program should pay attention to include the parents and the teachers in the programs.

Discussion

In my dissertation, with the help of three empirical studies I argue that social categorization has an epistemic function by helping children designate reliable sources of information. In this case, social categorization is important not only to distinguish our partners from each other, but also to recognise the boundaries between knowledge contents.

In the first study, we demonstrated that children learn culture-specific knowledge only from native speaker persons. At the same time, they also pay attention to the foreign speaker persons and are able to recall the information comes from them, but they do not incorporate it into their own cultural knowledge base.

In our second research, we tested whether children expect people speaking their own mother tongue to have the same culture-specific knowledge content. We designed an eye-tracking study and the results showed that children were surprised if two native speaker people used different tools for the same purpose.

In the third study, we used a very similar procedure as we used in the second experiment and demonstrated that two-year-olds do not necessarily form expectations about foreign speakers commonly shared knowledge. This result suggests that language and language-based social categorization does not only operate on the similarity expectations, but rather serves as genuine knowledge-based distinction.

The theory of shared cultural knowledge highlights the positive, beneficial function of social categorization. At the same time, during everyday life, the negative consequences are highlighted. Studies with young children have shed light on the possibility that negative aspects of social categorization may not be innately related to the process. If true, the

development of an appropriate intervention programme could indeed prevent, or at least reduce the negative manifestations of social discrimination. However, the practical proposals in the dissertation are rather theoretical for the time being, but in the future it would be important to examine their effectiveness in practice through research.

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