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Children's Use of Social Category Information in Predicting Social Relationships

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Abstract

Previous research has shown that children form concepts of specific social categories, exhibit a preference for individuals belonging to a certain social category, and demonstrate essentialist reasoning about some social categories from a fairly young age. The current experiment sought to connect research between these three aspects of reasoning about social categories to examine how children use information about a social category to evaluate relationships. We propose that children can either reason about others' relationships using social categories either under an associative framework or a causal framework. We hypothesize that older children would reason under a causal framework based on increased understanding of the different underlying reasons for each relationship, while younger children would reason under an associative or similarity-based framework, seeing a social category as a cross-cutting factor that underpins a sense of common membership across a variety of relationships. In Experiment 1, children were asked to predict from a series of cartoon faces which two children belonged in a specific relationship with the target child—either family, friend, or neighbor. One of the choices matched the target in terms of race, while the other did not. Overall there was a significant interaction between relationship type and children's response, and an age effect such that this pattern held for older but not younger children. In addition, children most often selected the race 'match' response for family trials but not for other relationships, hinting at stronger essentialist beliefs associated with race when used to evaluate family relationships. In Experiment 2, children were asked to perform the same task, but the faces matched in term of gender instead of race. Here, we did not find a significant interaction between relationship type and answer. Future studies should examine the response pattern across a wider variety of social categories to investigate how essentialist beliefs fluctuate based on the specific category-based inference children are making and the specific social categories being assessed.

Introduction

Stereotyping and bias is a problem that our world has been trying to come together to solve for decades. While the more old-fashioned type of racism or sexism of openly voicing discriminatory hatred is less common these days, a more contemporary form of bias that involves implicit biased attitudes is still very much evident (Gaertner & Dovidio, 2005; Katz & Hass, 1988; Kinder & Sears, 1981; McConahay & Hough, 1976; Pereira, Vala & Costa-Lopes, 2010; Pettigrew & Meertens, 1995; Sue, 2001). Sometimes, implicit biases can hurt people despite the lack of intent to harm: a trans woman being called out for going to the “wrong” bathroom, a Chinese salon worker being automatically assumed to not speak English, or a woman deliberately or unconsciously avoiding Black men on the streets on her way home. These expectations and assumptions about particular groups, even though they do not stem from malicious intent, are still the result of the biases and stereotypes rooted in our mind. One type of assumption that is especially prevailing is assumptions about relationships: queer people are still being denied entry to visit their sick partners at hospitals, and non-white youth from multiracial families are often mistaken as a maid or a helper. It is important to understand better how these biases and expectations develop.

The current study is focused on exploring the expectations about social relationships based on social category membership described above from a developmental perspective: how do children use information about social categories when evaluating others' social relationships? Do they view

membership in the same social category as a trait that associates people together in general, or is the importance of each social category causally dependent on which social relationship it is?

Preference in Social Categories.

Preference tasks are often used to examine both explicit and implicit biases. Studies on looking-time preference have supported infants' ability to distinguish certain social categories like race, gender, age, and language groups starting as early as 3 or 4 months of age (Bar-Haim, Ziv, Lamy, & Hodes, 2006; Kelly, Quinn, Slater, Lee, Gibson, Smith, & Pascalis, 2005; Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002). At older ages, additional cues like friendship preference tasks, social behaviors, trust in learning, as well as resource allocation tasks can shed light on children's preferences over a variety of social categories.

Gender. When a group of 2- to 3- year-old children were put into a playroom, they exhibited more social behaviors towards peers of the same sex (Jacklin & Maccoby, 1978; Moller & Serbin, 1996). At the slightly older age of 4- and 5- year-olds, when asked to select who they would want to be friends with, children showed a same-sex or same-race preference (Abel & Sahinkaya, 1962).

Language and accent. Infants more often imitated the actions of those from their language in-group (Buttelmann, Zmyj, Daum, & Carpenter, 2012). By preschool-age, children preferred to learn from native-accented rather than foreign-accented speakers on non-language related information (Kinzler, Corriveau, & Harris, 2011). 5-year-olds preferred to be friends with native

speakers of their native language over foreign-accented speakers or speakers of a foreign language (Kinzler, Shutts, DeJesus, & Spelke, 2009).

Race. Although the earliest studies on doll preference found an overall preference for white dolls amongst 4-8 year old children, later studies did not replicate this result, and instead found an overall own-race preference (Katz, & Zalk, 1974 ;Hraba & Grant, 1970;) Racial bias continues to be evident in more sophisticated tasks, such as resource allocation games or justifying uneven resource allocation (França & Monteiro, 2013; Rutland & Killen, 2017). However, it is worth noting that this bias could change when more than one social category is involved. For example, in a friendship preference task, while 5-year-olds preferred to be friends with silent children of the same race, once accent was pitted against race, they preferred children of a different race with a native accent over children of the same race with a foreign accent. (Kinzler, Shutts, DeJesus, & Spelke, 2009).

All these preference tasks illuminate the underlying biases in children's personal preference. However, are children's personal beliefs transferable to what they expect from the rest of the world -- that other people will exhibit the same preferences as they do? In the current study, by asking children to evaluate other people's relationships, we aim to gain a better understanding of their overall expectations of the world based on specific social categories, not just within their personal preference.

Essentialism.

Children's expectations of the world can stem from many reasons, and one of the most commonly studied causal reasons is essentialism. Essentialism is the belief that categories are defined by certain unchangeable and hidden properties, and that these properties account for the similarities amongst members of the same category (Gelman, 2003). It is important to note that essentialism thus lends itself to a causal framework for the in-group preferences described above that is separate from surface-level similarities that can be observed. In other words, the "essence" is what determines identity and membership of a group, as well as what causes the similarities; similarities, while useful for noting shared traits, are not the causes for group identity and membership. In Keil's transformation studies using animals, the experimenter posed this question to children: If a skunk underwent surgery to look like a raccoon, is the animal still a skunk, or a raccoon? While younger children believed that the skunk is now a raccoon, older children believed that the skunk is still a skunk, despite the lack of visible properties that belong to a skunk -- demonstrating that they believe in a skunk "essence" that is crucial to the identity of the skunk (Keil, 1989).

The concept of essentialism is not limited to just animal species -- there is evidence for essentialism-based reasoning about social categories as well (Diesendruck & Haslam, 2006; Gil-White, 2001; Haslam, Bastian, Bain, & Kashima, 2006; Rothbart & Taylor, 1992; Taylor, 1996). There are multiple ways to test essentialism, all focusing on the idea that a hidden essence can be transmitted or retained despite physical changes. An example of this is asking for predictions on

who they think a child will grow up to be, or who an individual's child or parents are. Interestingly, children seem to demonstrate more essentialist belief within certain social categories than others.

Race essentialism. Several studies have found strong essentialism beliefs regarding race in children. For example, preschool-aged children are more likely to say that a child is the same race as their birth parents instead of their adoptive parents when shown a switched at birth scenario (Gelman & Wellman, 1991; Giménez & Harris, 2002). When asked about which picture represents an adult when they were a child, preschool-aged children also selected the race-match pictures over the non-race match pictures (Hirschfeld, 1995, 1998). These studies support the claim of racial essentialism in children where they view race as a stable, unchanging trait that is related to group memberships, such as biological families.

Gender and language essentialism. Gender and language categories, while based on fewer biological factors than race or species categories, may also be linked to essentialist beliefs. Taylor, Rhodes, and Gelman (2009) found that young children tend to apply essentialism beliefs to gender and species similarly, viewing both behavior and physical properties as inflexible and intrinsically linked to membership in the category. Older children, however, apply fewer essentialist beliefs about gender compared to species. A similar trend is seen with language: Gelman and Hirschfeld (1997) found that 5-year-olds tend to predict that a child switched at birth will speak the same language as their birth parents instead of adoptive parents. Meanwhile, as adults, we know that

language learning is largely environment-based and not inherited, thus we do not essentialize language categories. Children also seem to essentialize accent, perhaps even more so than race. In a study where accent were pitted against each other, both older children (nine to ten years old) from European American backgrounds and younger children (five to six years old) from African American backgrounds applied more essentialist thinking towards race than language, whereas younger children from urban/racially diverse and rural/racially homogeneous backgrounds did the opposite (Kinzler & Dautel, 2012). This study demonstrates not just a difference in race and gender essentialism, but also a developmental change of that difference.

Inductive potential as an indicator of essentialism. The majority of these studies mentioned above examine essentialism through the extent in which children believe each social category to be hidden and unchanging. However, another sign of essentialist belief is the act of making category-based inferences -- meaning the extent to which one sees a specific category as a reliable factor to base any assumptions on (Gelman 2003); this is also called inductive potential. There are indicators of this happening at various ages, starting as early as age 2 (Poulin-Dubois, Serbin, Eichstedt, Sen, & Beissel, 2002; Serbin, Poulin-Dubois, Eichstedt, 2002). Children appear to base inferences about toy preferences, social morals, and ambiguous behaviors on gender (Berndt & Heller, 1986; Giles & Heyman 2004, 2005; Heyman 2001). They also appear to draw connection between membership of one social category to another. For example, preschoolers understand that members of some social

groups speak in distinct ways, but do not understand that members of other social groups speak different languages (Kuczaj, 1982). In addition, three to five year olds believe that two speakers who speak with the same accent live in the same place, but do not share the same personal preferences; four and five year olds believe that two speakers with the same accent share certain place-related cultural norms, but that two speakers with different accents have different cultural norms (Weatherhead, White, & Friedman, 2016). By the age of six, with increased verbal ability, children have an improved understanding of the relation between the language a person speaks and that person's nationality or culture. When given explicit information about what language an individual speaks, they relied on this information to predict the individual's nationality (Penny, Barrett, & Lyons, 2001). 6-year-olds also attribute nationality differences as a cause for language differences and shared nationality as a cause for shared language. (Jahoda, 1961; Piaget & Weil, 1951). All these are examples of children seeing a certain social category as having high inductive potential.

While inductive potential is not identical to essentialism, they are consistent with essentialism in two major aspects. Firstly, the inferences children draw involve invisible and internal features, which are parts of the definition for essentialism (Gelman, 2003). Secondly, children continue to infer from categorical membership even when it is pitted against perceptual similarity (Deák & Bauer, 1996; Heyman & Gelman, 2000).

Non-Social Categories

The literature on categories and category-based inference has largely been developed in domains other than social cognition; thus, examining children's expectations about non-social categories might provide us with insight into their views of social-categories. Interestingly, while social categories have mainly been studied separately in a very specific manner (e.g., gender, race, language groups, national groups) or in the form of hypothetical minimal groups, non-social categories have been largely divided by psychologists into two kinds - - natural kinds and artifacts. Natural kinds are things found in nature, such as animals, plants, or substances. Artifacts, on the other hand, are things created by humans, such as tools, clothing, or furniture. Broadly speaking, internal features tended to be more important for categorizing natural kinds in comparison to artifacts (Barton and Komatsu, 1989; Gelman, 1988; Keil, 1989; Rips, 1989).

A series of studies by Rhodes and Gelman have found that children's views of certain social categories paralleled their views of natural kinds and artifacts. First, they found that out of the two non-social categories, children were more flexible about unusual artifact categories compared to unusual animal categories. In other words, they viewed artifact categories as more subjective, and animal categories as more objective (2009a). In a follow-up study, they found that children also rejected partial membership in animal categories, but were more tolerating of partial membership in artifact categories; something cannot be "sort of a bird," but can be "sort of a tool" (2009b). They later found that two human social categories -- race and gender -- were treated differently following a similar pattern of natural kinds and artifacts. Gender was viewed

under a framework similar to that of natural kinds, with strict and discrete boundaries; meanwhile, race was viewed under a framework similar to that of artifacts, with more flexible boundaries (Rhodes, Gelman, & Karuza, 2014). The parallels between gender and race to the two types of non-social categories examined here hints at other potential differences between other social categories as well.

The Current Study.

The main purpose of this study is to determine how children use information about social categories when making judgments about others' social relationships. There is evidence for early-on category-based inferences as well as personal preferences, and we are interested in exploring if children make predictions about others' preferences based on shared membership of a specific social category.

We propose that information about social categories can operate under two different possible types of conceptual frameworks: an associative framework, or a causal framework. Under an associative framework, children see a certain social category as an overarching trait or membership that brings people together regardless of the specific type of social relationship. Given the earlier discussion on how children, especially young children, prefer in-group members across a wide range of preference tasks, the associative framework appears to be plausible. In addition, there is evidence that children making category-based inferences across a variety of prediction tasks, and thus they may make social category-based inferences across all social relationships as

well. However, the other possibility is that information about social categories operate under a causal framework; that is, depending on the social relationship we are evaluating, the importance level of category-based inferences change. This is possible given that some studies have documented different levels of category-based inferences when one social category is pitted against another. In addition, there is a lack of literature to support essentialism outside of family-based relationships. Thus, it is possible that without the inductive reasoning that accompanies the strong essentialist beliefs, children may make predictions about other relationships, such as friendship or neighbor relationships, differently.

The current study contributes to the literature on social categorization and social relationships in two major ways. First, it bridges the research between the inner formation of social category concepts and the outward exhibitions of stereotyping and bias. Children form concepts about social categories based on the world around them, but they may also exhibit preferences and biases that do not match the world around them perfectly. By focusing on how children draw from social category information to predict others' social relationships, we are examining their expectations about the world, which could be different from their personal preferences.

The other benefit of this study is that it adds to the investigation of the causal structure of relationships outside of the rich literature on family-based essentialism. While we see evidence for children's essentialist beliefs through their predictions about parent-child relationships based on race, it is important

to also understand how children make category-based inferences about other relationships, and whether it differs from one social category to another.

In the current study, we asked children to make predictions about members in a social relationship. We presented them with a series of triads of cartoon faces. One of the bottom faces matched the top face in terms of a specific social category (race or gender) and we asked the children who they think is in a social relationship (family, friend, or neighbor) with the top face. The three social relationships we asked them about were sibling, friend, and neighbor. They had the options of answering the left face, right face, or both. We recorded their answers and compared the response pattern both within and across the three types of social relationships.

Hypothesis. We developed two sets of predictions based on the causal and associative frameworks. If children are reasoning under the associative framework, they would show similar response patterns across the different relationships, meaning that they do not distinguish the usage of categorical information in predicting sibling, friend, and neighbor. In other words, that particular social category is seen to be a factor that brings people together in all kinds of social relationships. However, if they are reasoning under the causal framework, they would show distinct response patterns across the different social relationships, such as selecting match more often in the sibling relationship question than the friend relationship question. In this case, information about the specific social category is valued differently depending on the different social relationship.

Furthermore, we predict that there will be a developmental difference in the response patterns: younger children will reason under an associative framework and older children will reason under a causal framework. There are several studies supporting this possibility. For example, Keil's transformation studies (1989) documented younger children exhibited weaker essentialism beliefs compared to older children when asked about transforming a skunk through surgery. In Kizner and Dautel's study (2011), older European American children demonstrated stronger race essentialism. There is also evidence that children make more extreme category-based inferences regarding stereotype (Martin, Wood, & Little; 1990). Finally, we believe that older children would have a better understanding of the underlying differences between how each social relationship is formed, thus apply different levels of category-based inferences to them.

The two specific social categories we are testing in this study is race and gender. We selected these two studies because they are the most commonly studied in the literature of social categories, and also have demonstrated differences parallel to non-social categories. We have completed data collection of Experiment 1, and thus the thesis will focus on discussing the results from Experiment 1. Meanwhile, Experiment 2 serves as a pilot study that opens up possibilities for other future directions.

Methods

Experiment 1: Race

Participants.

Participants were 41 4- to 8-year-old English-speaking children ($M=5.49$ years, $SD=1.41$ years, range = 4;0 months to 8;11 months; 21 females, 20 males) in Middletown, Connecticut. One female participant was excluded for providing answers that were not amongst the three options. All participants were tested in local preschools or in the Wesleyan Cognitive Development Lab.

Materials.

Each child was presented with a series of 12 slides on a laptop computer. Each slide consisted of a triad of simple cartoon faces from sweetclipart.com, with one of the two bottom faces matching the top face in terms of race. The gender of the faces switched every three slides, and other qualities of the faces like eye color, hairstyle, and accessories, are randomized. Two forms of the slides, Form A and Form B, were developed to counterbalance placement of the race faces as well as the sequence in which the slides were presented. Children were randomly assigned to view Form A or Form B. (See Appendix I for stimuli.)

Procedure.

Task Administration. Each participant received 12 trials. On each of the trials, three faces appeared on the screen. The experimenter said, "Look, this is [name of face on top]! And this is [name of left face], and this is [name of right face]." She pointed to each of the face as she said the name out loud. Children were then asked who they thought was the family, friend, or neighbor depending on the trial: "So, who do you think is [name of face on top]'s sister/brother/friend/neighbor?" The experimenter followed by providing three options for answering, "[Name of left face], [name of right face], or both?" while

pointing at the faces accordingly again. For the “both” option, the experimenter removed her finger from the screen. Children could respond by either saying the names out loud or pointing on the screen. At the end of the task, children were also asked questions about their understanding of each category to check that they understood the words “brother,” “sister,” “friend,” and “neighbor.” Older children were generally able to articulate the definition for each. While younger children sometimes could not give a specific definition, they were generally able to give examples of people from each category.

Coding. The data was initially coded based on physical location of the faces (Left, Right, or Both), and then re-coded to indicate the relationship between the social categories (Match, Non-Match, or Both). The trials were grouped by question type (Family, Friend, or Neighbor), resulting in 4 trials per question type. The data was then transformed to indicate proportion, out of the 4 trials, that they responded Match, Non-Match, or Both for data analysis.

Analysis. Our analysis focused on the question of whether there was an interaction between question type (Family, Friend, or Neighbor) and the proportion of each response (Match, Non-Match, or Both) using a repeated measures ANOVA.

Experiment 2: Gender (Pilot Study)

Participants

Participants were 12 4- to 5-year-old English-speaking children ($M=4.86$ years, $SD=0.29$ years, range = 4;5 months to 5;3 months; 5 females, 7 males) in Middletown, Connecticut. Three participants were excluded for providing

answers that were not part of the three options. All participants were tested in local preschools or in the Wesleyan Cognitive Development Lab.

Materials.

The materials in Experiment 2 were identical to the materials in Experiment 1 except the following changes: One of the bottom faces matched the top face in terms of gender, instead of race. In addition, the race of the faces switched every three slides. This is a pilot study, thus we only have one form of this set of materials. (See Appendix II.)

Procedure.

Task Administration. The procedure for Experiment 2 is identical to the procedure in Experiment 1. However, since the bottom faces were of different genders, the experimenter asked "So, who do you think is in [name of face on top]'s family?" instead of sister or brother.

Coding. The coding for Experiment 2 is identical to the coding in Experiment 1.

Analysis. The coding for Experiment 2 is identical to the coding in Experiment 1.

Results

Experiment 1: Race

Overall response. We analyzed the frequency of match, non-match, and both responses across the three question types (family, friend, and neighbor) to examine if children have different response patterns across the different question types. We conducted a repeated measures ANOVA with question type

and response as within-subjects factors, sex as a between-subjects factor, and age as a covariate. Mauchly’s test indicated that the assumption of sphericity had been violated $X^2(9)= 19.05, p=.025$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity. The results show that there was a significant interaction between question type and response, $F(3.05)=5.71, p=.001$. There was also a significant interaction between question type, response, and age, $F(3.05)=7.73, p<.001$. There was no significant interaction between question type, response, and sex, $F(3.05)=.259, p=.858$.

For the family question, match appeared to be the most common answer, whereas in both the friend and neighbor questions, both was the most common answer. Across all three question types, non-match was the least frequency selected answer. (Table 1.)

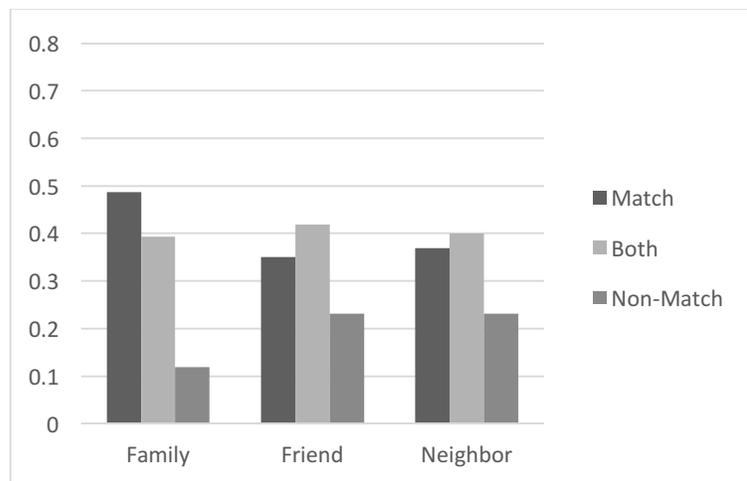


Table 1. Overall proportion of responses across question type. (Race)

Effect by Age. In order to examine the the difference between older and younger children, we conducted a median split of the participants into two groups, resulting in a split at the age cut off of 5.88 years: resulting in 20 children

in the younger age group (M=4.45, SD=0.26) and 20 children in the older age group (M=6.53; SE=1.30). There was no significant interaction between question type and response for the younger age group, $F(4)=.926$, $p=.454$. However, there was a significant interaction between question type and response for the older age group, $F(4)=3.232$, $p=.017$.

For younger children, both was the most common answer, appearing at least twice as much compared to the other answers within each question type. (Table 2.) Meanwhile, older children chose the match more often than both across all trials. (Table 3.)

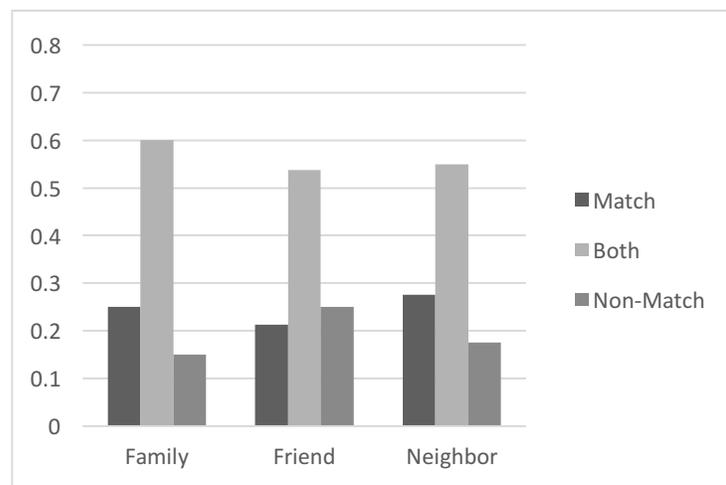


Table 2. Younger children’s proportion of responses across question type. (Race)

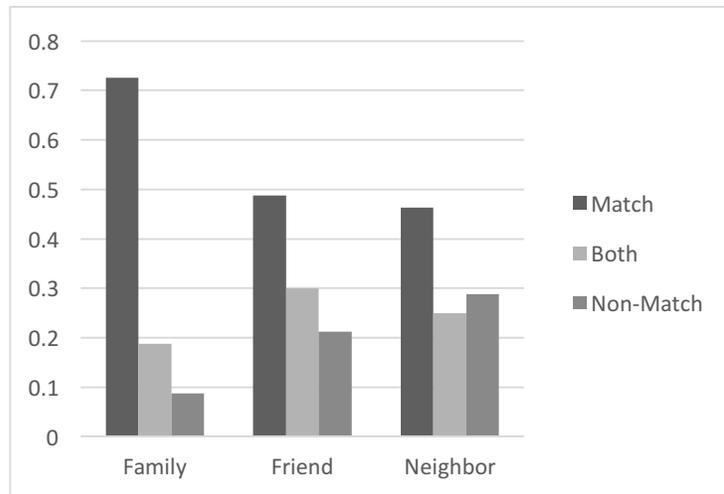


Table 3. Older children’s proportion of responses across question type. (Race)

Experiment 2: Gender

Overall response. We found that there was no significant interaction between question type and answer, $F(4)=1.024, p=.405$. We did not examine the effects of gender or age due to an insufficient number of participants.

Both was the most common answer across all three question types.

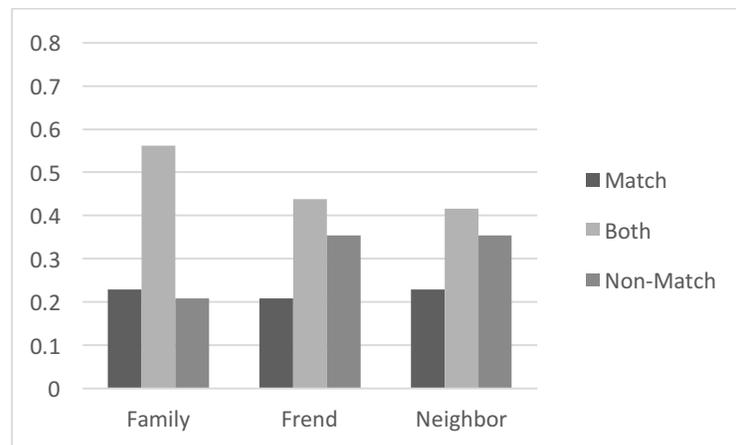


Table 4. Overall proportion of responses across question type. (Gender)

Item-Level Analysis:

For both experiments, we examined whether there were any substantial differences between the items to ensure that the results were not due to individual item differences. Overall, no significance was found between the items within each question type. All the means are listed in Table 7.

General Discussion

This study investigated how children use information about social categories when evaluating other's social relationships. Specifically, we wanted to know whether it is through an associative framework or a causal framework. Many studies have explored the formation of social categories, as well as the eventual outcome of this learning through observable displays of stereotyping or bias. However, fewer studies have examined the how social categories interact or influence children's general expectations about the world. The current study seeks to explore this area through asking children to make predictions about three different types of relationships, and evaluating whether these inferences are based on certain social categories.

The first major finding, from Experiment 1, was a significant interaction between question type and response. Contrary to seeing social categories as a general associative trait that is inductive to all social relationships, they seem to differ on how much they rely on social categories to make this assumption depending on which relationship is in question. Thus, instead of grouping like with like regardless of the specific relationship, children exhibited different response patterns. This supports the idea that children make these social category-based inferences under a causal framework instead of an associative

framework. Therefore, children do appear to understand that different social categories are connected to different social relationships differently. For example, we might expect race to play a bigger role in family relationships (given the perception of race is often based on a series of inheritable biological traits) than family or friendship.

The second major finding is an interesting contrast of the friendship results compared to previous studies. Many studies that have focused on personal friendship preferences have found a preference for the in-group member (Abel & Sahinkaya, 1962; Kinzler, Shutts, DeJesus, & Spelke, 2009). However, we did not find the same trend in friendship – in fact, across all the friend trials, children selected “both” more frequently. This could indicate two things. First, although children do have personal preferences when it comes to friendship choices, they do not necessarily apply this preference to other people. More importantly, perhaps, we see evidence that children do not apply their biases to others. The second indication of a different response pattern for personal preference and predicting others preferences one related to methodology. Contrary to previous studies with a forced-choice design between the match and mismatch, our study allowed children to select “both” as an answer. This hints at the possibility that even though children will lean towards the match when forced to choose, in the real world where they encounter countless of choices that are less limiting, this bias might not come into play in their decisions so strongly.

The third major interpretation based on these results is that, given the different levels of induction based on question type, this pattern might also suggest different levels of essentialism for different social relationships. Overall, in Experiment 1, which looked at the social category of race, children selected the highest number of matches on the family trials, and the lowest amount of non-matches on the family trials. The family trial was also the only trial where children selected the 'match' option more often than the 'both' option. Meanwhile, for both the friend and neighbor trials, children selected the both option most frequently, followed by match, then non-match. Thus, children seemed to show more essentialized thinking on race for family, whereas they were more open to friend and neighbor being unrelated to race. This finding mirrors the previous research literature of strong essentialized thinking when it comes to family, specifically for parent-child relationships (Gelman & Wellman, 1991; Giménez & Harris, 2002).

It is difficult to draw conclusions about Experiment 2 since the sample size is much smaller. From what we can observe in the patterns of data, there appears to be no interaction found between question type and answer, but we are refraining from making any concrete inferences from this result.

Furthermore, when children from Experiment 1 were split into two groups by age, it is revealed that older children had a different response pattern compared to younger children. We found a significant interaction between question type and answer in older children, but not so in younger children. Since a higher number of "match" responses indicates a stronger belief in essentialism,

This suggests a developmental increase in essentialism. Moreover, the older children demonstrated a dramatic response pattern: the family trials provided a high number of matches that was around 6 times the number of non-matches and 4 times the number of 'both' responses. In both the friend and neighbor trials, 'match' was the most common response. Meanwhile, for the younger children, 'both' was the most common answer across all three question types. A developmental trajectory leaning towards stronger category-based inference is clearly present, suggesting increased essentialist thinking. We did not find any significance of interaction when we split the group by gender, and the response patterns across each gender appear to be similar -- although the female group approached significance while the male group did not.

The developmental finding of increased essentialism over time is concerning because there have been multiple studies and theories documenting the risks of such essentialist reasoning. For example, if a particular social category is essentialized, one might begin to justify group differences as naturally occurring and unchangeable, thus reducing the probability of working towards equality (Brewis, 2001; Gould, 1981; Landrine, 1998; Mahalingam & Rodriguez, 2003). In addition, essentialism might lead to faulty reasoning of drawing associations that should not exist, such as a tendency to associate sex/gender with social circumstance (Tavris, 1999).

Another negative effect of essentialism is its potential to be self-limiting. If children believe in strict, immutable "rules" that are innate for membership of a certain category, they may limit themselves to those rules and avoid chances to

develop other possibilities outside of the perceived boundaries. For example, concepts about strict gender roles may cause them to adhere strictly to the stereotypes and have less chance to explore interests, occupations, or lifestyles in general that do not adhere to that gender role. Socially, essentialism appears to be correlated with a tendency to internalize challenges as helpless situations, as well as result in increased negative self-attributions (Erdley, Cain, Loomis, Dumas-Hines, & Dweck, 1997; Heyman & Dweck, 1998). Essentialist reasoning about intelligence has also been shown to be correlated with lower academic achievement, negative attitudes, lowered expectations, as well as decreased motivation when facing challenges (Cain & Dweck, 1995; Stipek & Granlinski, 1996). Furthermore, this limiting quality associated with essentialism may even have an impact on the overall mindset -- in one study, essentialism was found to be negatively correlated with overall creativity development (Tadmor, Chao, Hong, & Polzer, 2013).

Finally, various studies have supported a correlation between essentialism and quick, often negative, judgements about others, such as stereotyping (Chiu, Hong, & Dweck, 1997; Erdley & Dweck, 1993; Levy & Dweck, 1999; Bastian & Haslam, 2006; Yzerbyt, Corneille, & Estrada, 2001; Hamilton, Sherman, & Rodgers, 2004; Pauker, Ambady, & Apfelbaum, 2010). All of these negative qualities associated with essentialist beliefs cautions us against the development of such beliefs and should serve as a motivation to investigate how these beliefs are formed, used, and can possibly be reduced.

The current study leaves us in a hopeful position. The developmental increase in essentialist thinking hints that this mode of essentialist thinking is not innate, and thus might be able to be reduced through environmental factors. In addition, the 'both' option was often the most common or second most common answer across all the trials. This suggests that overall, children are *open* to race or gender not being a definitive factor in determining social relationships between people.

Limitations and Future Directions. Several limitations of the current study must be discussed. Firstly, the stimuli provided in the current study are simplified cartoon faces instead of photographs or encounters with people in the real life. Thus, the pictures may only depict a trait or two that are considered important for each social category (such as skin color for race, or hair length for gender), but not include all the factors that children take into consideration when deciding social categorical membership. We do not know for certain whether children will react to people in person the same way they reacted to the pictures.

In addition, a bigger and more diverse sample size could be beneficial to strengthening the generalization of the findings. Our sample is limited to the population residing in Middletown, Connecticut, and the participants tested skews towards White American children. The study would have to be conducted with different populations to determine whether this increased sign of essentialism is present across different environments. One possibility is that there might be cultural differences in this developmental change.

Finally, it would be interesting to run this study over a variety of social categories to see if the pattern of responses does indeed vary across them. We started doing so in Experiment 2, but for now our sample size is relatively small and thus we were not able to directly compare with the results in Experiment 1. Comparing a series of responses over different social categories would allow us to examine the development of essentialist beliefs with each category. This would be helpful in both understanding how each social category differs from the others in terms of causal frameworks, as well as investigating signs of essentialism in each instance instead of as an overarching mindset.

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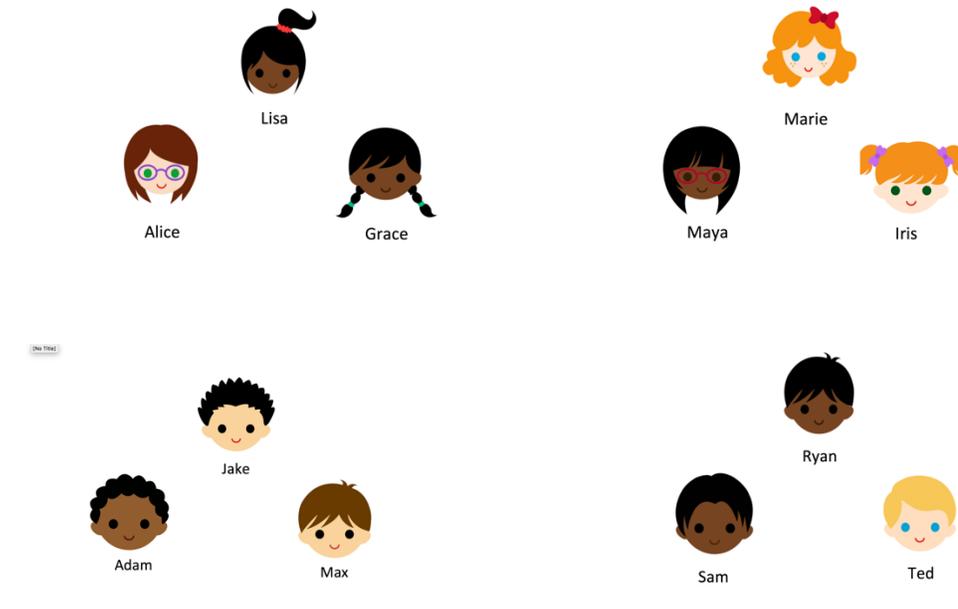
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Appendix I. Sample Slides for and Script for Experiment 1

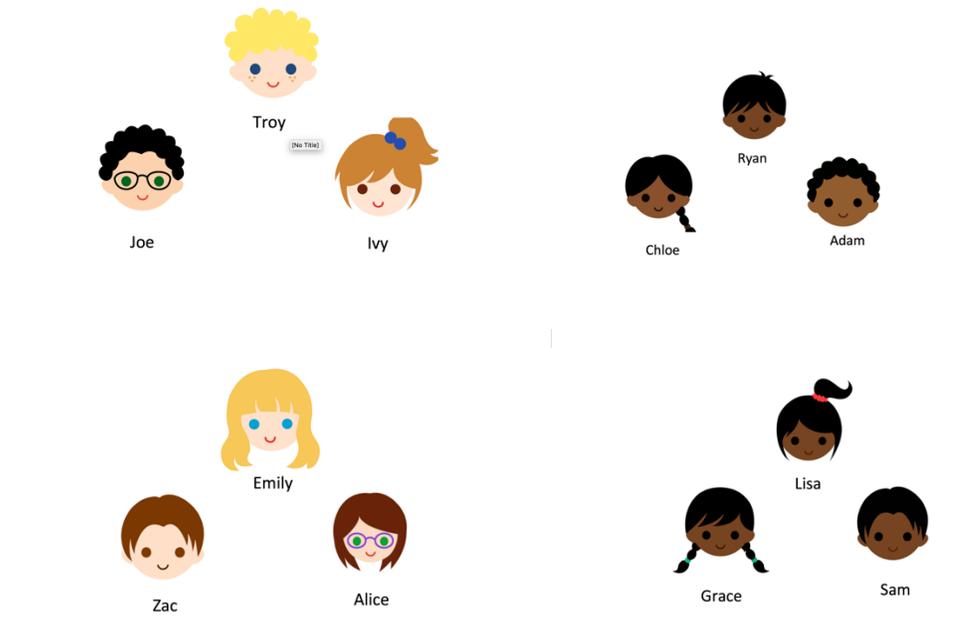


Script:

1. Today, we are going to play a game! I am going to show you some pictures of kids and ask you about them. Are you ready?
2. Look! This is A. And this is B, and this is C.
3. So, who do you think think is A’s brother/sister? B, C, or both?
4. So, who do you think is A’s friend? B, C, or both?
5. So, who do you think is A’s neighbor? B, C, or both?

A refers to the name of the top face, whereas B refers to the name of the bottom left face, and C refers to the name of the bottom right face.

Appendix II. Sample Slides for Experiment II



Script:

1. Today, we are going to play a game! I am going to show you some pictures of kids and ask you about them. Are you ready?
2. Look! This is A. And this is B, and this is C.
3. So, who do you think think is in A’s family? B, C, or both?
4. So, who do you think is A’s friend? B, C, or both?
5. So, who do you think is A’s neighbor? B, C, or both?

A refers to the name of the top face, whereas B refers to the name of the bottom left face, and C refers to the name of the bottom right face.