SHORT REPORT

Young children’s automatic encoding of social categories

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Abstract

The present research investigated young children’s automatic encoding of two social categories that are highly relevant to adults: gender and race. Three- to 6-year-old participants learned facts about unfamiliar target children who varied in either gender or race and were asked to remember which facts went with which targets. When participants made mistakes, they were more likely to confuse targets of the same gender than targets of different genders, but they were equally likely to confuse targets within and across racial groups. However, a social preference measure indicated that participants were sensitive to both gender and race information. Participants with more racial diversity in their social environments were more likely to encode race, but did not have stronger racial preferences. These findings provide evidence that young children do not automatically encode all perceptible features of others. Further, gender may be a more fundamental social category than race.

Research highlights

- Automatic encoding of race and gender was measured in 3- to 6-year-old children.
- Children showed automatic encoding of gender by 4 years of age.
- None of these age groups showed reliable automatic encoding of race.
- Race encoding was positively correlated with exposure to racial diversity.

Introduction

Imagine a child meeting a neighbor for the first time. What will the child notice and remember later? That the neighbor is female? That she is African American? That she is wearing a grey sweater, or has long eyelashes? Limits on attention and memory may prevent children from encoding all perceptible dimensions upon encountering a person. In the face of such limits, what information do children encode?

Gender and race are especially likely candidates for automatic encoding, given each category’s visual prominence (Bigler & Liben, 2007; Fiske & Neuberg, 1990). Infants can distinguish faces by gender and race (Quinn, Anzures, Izard, Lee, Pascalis et al., 2011), and children use gender and race to guide their social preferences and inferences about other people (Aboud, 1988; Ruble, Martin & Berenbaum, 2006). An abundance of research on attitudes and stereotypes shows that adults are highly attuned to both gender and race (Nelson, 2009). But how fundamental are these social categories to humans’ consideration of any given individual? Here we probe this question by assessing and comparing young children’s automatic encoding of a person’s gender and race.

Most previous studies of young children’s attention to gender and race have relied on tasks in which participants see pairs or collections of pictures and then must sort these images into groups, indicate their social preferences, or make inferences about others. In a typical sorting task, children are asked to generate piles of pictures of people who ‘go together’; in a typical social preference task, children are asked to select potential playmates from displays that present a boy and a girl, or...
a White child and a Black child; and in a typical inference task, children are asked to think about which people (e.g. two boys, or a boy and girl) share hidden properties or relationships with one another. Children use visual information about gender and race to guide their responses in all these tasks at least as early as the preschool years (e.g. Aboud, 1988; Bigler & Liben, 1993; Kowalski & Lo, 2001; Ramsey & Myers, 1990; Shutts, Roben & Spelke, 2013; Waxman, 2010; Yee & Brown, 1994).

The aforementioned tasks do not, however, reveal whether young children spontaneously attend to and remember social category information when they simply encounter an individual person. The arrangement of displays (e.g. pairs of photographs; Dunham & Degner, 2013) or the experimenter’s prompts (e.g. ‘Make piles of people who go together’; ‘Who would you want to be friends with?’) may encourage children to attend to contrasts in gender or race. Testing automatic encoding requires a method in which participants encounter individuals in a context that ostensively has nothing to do with social categories. Over 30 years ago, Taylor, Fiske, Etcoff and Ruderman (1978) developed such a task for adults: the ‘memory confusion protocol’. In a typical memory confusion study, participants encounter a number of individuals, each associated with a different utterance. Later, participants must match individuals with their utterances. A greater number of ‘within-dimension’ errors (e.g. attributing one woman’s utterance to another woman) than ‘between-dimension’ errors (attributing a woman’s utterance to a man) indicates that participants automatically encoded that dimension (gender) during the familiarization phase.

In classic memory confusion studies, adults show automatic encoding of both gender and race, and attempts to reduce encoding of these two categories typically fail (see Cosmides, Tooby & Kurzban, 2003). A handful of studies have shown that school-age children also encode gender and race in memory confusion tasks. Susskind (2007) found that 9- to 12-year-old US children encoded both the gender and race of unfamiliar individuals with equal strength, and Bennett, Sani, Hopkins, Agostini and Malucchi (2000) reported gender encoding by 7- to 12-year-old Italian children. Finally, in research with 5- to 11-year-old British children, Bennett and Sani (2003) showed that participants automatically encoded the gender of their classmates in one study and the race of unfamiliar children in another study.

A possible conclusion from this body of research is that gender and race are both robustly encoded by people across the lifespan. However, one finding from the adult literature suggests that these two dimensions do not carry equal weight in person perception: Kurzban, Tooby and Cosmides (2001) were able to attenuate adults’ encoding of race – but not gender – by presenting participants with coalitional alliances that were orthogonal to group membership (e.g. two different teams with Black and White people on each). These findings suggest that race encoding is less resilient or inevitable than gender encoding – and, by extension, that gender may be a more fundamental category for humans’ consideration of individuals. Indeed, in interpreting their findings, the authors noted that, although humans did evolve in contexts where gender would have been relevant (e.g. for decisions about mating), our ancestors did not live in communities comprising people from different racial categories. Therefore, while humans might have evolved cognitive machinery dedicated to tracking a person’s gender, it is unlikely that humans evolved dedicated machinery for tracking a person’s race; rather, race encoding may be a byproduct of a system for tracking coalitional alliances (Cosmides et al., 2003). These findings also raise the possibility that very young children – who, relative to adults, have had fewer opportunities to interact with people from different racial groups or to learn about the structure of coalitional alliances in their society – might encode race less robustly than gender. To date, however, no study has directly compared young children’s automatic encoding of these dimensions as they encounter novel individuals.

In the present study, we conducted a direct comparison of young children’s automatic encoding of gender and race. Instead of using different tasks to test for gender and race encoding (as in Bennett & Sani, 2003), we used identical procedures in two conditions. We predicted that gender encoding would emerge earlier and more robustly than race encoding among young children. To test this prediction, we extended our sample to include younger children than have been included in previous studies of automatic encoding: Participants ranged in age from 3 to 6 years. To accommodate limitations on young children’s reading and language processing skills, participants were asked to recall which targets saw which animals at the zoo (rather than recalling which targets had uttered different sentences, as in the classic memory confusion paradigm).

In addition to the encoding task, participants completed a standard social category preference measure (e.g. Kowalski & Lo, 2001; Shutts et al., 2013). Given findings from decades of research on social attitudes, we expected participants to prefer same-gender and White children (see Aboud, 1988; Ruble et al., 2006); thus, the preference task served to verify participants’ ability to perceive contrasts in gender and race (in case they did not show sensitivity to these categories in the encoding task). Finally, we asked parents to report the racial
composition of children’s social environments. If automatic encoding of race depends on a history of learning about racial groups, children’s exposure to racial diversity might be positively correlated with their race encoding.

Method

Participants

Participants were 3- to 6-year-old children (N = 192: 12 girls and 12 boys at each age in two conditions). Most participants were White (93%); others were Black (N = 1), Asian (N = 1), multiracial (N = 13), or their race was unknown (N = 1). All participants lived in or near a medium-sized city in the Midwestern US where the population is 79% White and 7% Black (US Census, 2010). Additional children participated in the study, but were excluded from data analyses due to not finishing the session (N = 28), experimenter error (N = 2), or parental interference (N = 1).

Materials, procedure, and design

A White female experimenter tested children in the lab or in their preschool. Children were randomly assigned to condition: Those in the gender condition completed a gender encoding task followed by a gender preference task; those in the race condition completed a race encoding task followed by a race preference task. Tasks featured photographs of unfamiliar children who displayed positive expressions, wore gray shirts, and appeared against a white background. Only faces and shoulders were visible. Boys’ hair stopped above their ears; girls had longer hair. White children had brown hair and light skin; Black children had dark hair and dark skin.

Encoding

The experimenter first informed participants that they would meet four children who had each seen different animals at the zoo. There were four task blocks, each comprised of a familiarization phase followed by a test phase. During familiarization, participants saw four different child–animal pairings, one at a time. For each pairing, participants saw a target child, heard which animal that target saw (e.g. ‘This kid saw the giraffe’), and saw a picture of the animal. Total presentation time for each pairing was 8 s. At test, participants received four pictures of animals (randomly clustered at the participant’s midline) and were asked to match the animals with the four targets (arranged in a row above the cluster).

The same four targets appeared in every block, each time with new animals. The gender condition included photographs of two White boys and two White girls; the race condition included photographs of two White children and two Black children who matched the participant’s gender. The White targets in both conditions were the same. Pilot testing with adults indicated that the four pairs of gender- and race-matched children were equally discriminable (see Supporting Information). The order of targets’ appearance during familiarization was counterbalanced across blocks and participants, while the positioning of targets during test was counterbalanced across participants, but remained stable across blocks for each participant.

Preferences

On each trial, participants saw a pair of equally attractive faces and were asked to point to the person they would want to befriend. The gender condition included six unique boy–girl pairs (boys on the left for three trials), while the race condition included six unique White–Black pairs featuring children of the participant’s gender (White children on the left for three trials). None of the photographs had appeared in the encoding task.

Scoring and analysis strategy

Following previous research (e.g. Taylor et al., 1978), we calculated an adjusted error difference score to capture each participant’s automatic encoding: (total within-category errors) – (total between-category errors / 2). ‘Within-category errors’ were cases in which participants misattributed an animal sighting to a child who matched the category status of the correct target. ‘Between-category errors’ were cases in which participants misattributed an animal sighting to a child who did not match the category status of the correct target. Dividing by two accounts for the fact that between-category errors were twice as likely as within-category errors to occur by chance. Skewness and kurtosis values for scores were 0.47 and 0.61 (respectively) in the gender condition, and −0.19 and −0.65 (respectively) in the race condition, and were therefore considered within normal limits for parametric analyses (Miles & Shevlin, 2001). We also conducted non-parametric tests to confirm key findings.

For the preference task, choices of same-gender targets (gender condition) or White targets (race condition) were scored as ‘1’, and choices of other-gender targets or Black targets as ‘0’. We created a preference score for each participant by averaging responses across the six trials. Skewness and kurtosis values for preference scores were −1.12 and 0.58 (respectively) in the gender condition, and −0.64 and −0.31 (respectively) in the race condition.
Results

Encoding

Participants of all ages made many errors (M errors at 3 years = 11.96 out of 16 opportunities; 4 years = 10.48; 5 years = 8.58; 6 years = 7.94). Participants in the gender condition made disproportionately more within- than between-category errors (Chance = 0; M adjusted error difference score = 1.49, t(95) = 5.15, p < .001), while those in the race condition did not (M adjusted error difference score = 0.07, t(95) = 0.22, p = .830). Participants were equally likely to make within-category errors involving children of their own gender vs. children of the other gender (t(95) = 0.20, p = .843); they were also equally likely to make within-category errors involving Black vs. White children (t(95) = −0.80, p = .424). A 2 (participant gender) × 4 (participant age) × 2 (condition) ANOVA revealed only a main effect of condition (F(1, 176) = 10.77, p = .001; all other ps > .512).

Wilcoxon signed rank tests (with continuity correction) confirmed that participants made disproportionately more within-category errors involving children of their own gender vs. children of the other gender (W = 1999, z = 4.70, p < .001), but not in the race condition (W = −2, z = −0.01, p = .996). Mann-Whitney-Wilcoxon rank sum tests (with continuity correction) confirmed that error difference scores differed significantly by condition (U = 5810, z = 3.12, p = .002). Figure 1 presents performance by participants at each age in each condition.

Preferences

Participants preferred same-gender children (Chance = 0.50, M = 0.80, t(95) = 12.58, p < .001) and White children (M = 0.67; t(95) = 6.07, p < .001). An ANOVA with participant gender, age, and condition as factors revealed main effects of condition (F(1, 176) = 11.29, p = .001) and participant gender (F(1, 176) = 7.80, p = .006): Participants showed stronger gender- than race-based preferences, and girls showed stronger preferences in general. However, both girls and boys preferred same-gender children (girls: t(47) = 12.33, p < .001; boys: t(47) = 6.83, p < .001) and White children (girls: t(47) = 7.68, p < .001; boys: t(47) = 2.29, p = .027).

Diversity

Questionnaire data were available for 172 participants. The average reported neighborhood composition was 86% White and 5% Black; the average reported childcare/school composition was 81% White and 8% Black (154 participants were enrolled in childcare/school).

Figure 1  Mean adjusted error difference scores at each age in each condition. One-sample t-tests to chance (0) appear above each bar in the graph. Error bars depict standard error. Wilcoxon signed rank tests confirmed that children encoded gender as early as four years of age (3 years: W = 63, z = 1.17, p = .243; 4 years: W = 150, z = 2.79, p = .005; 5 years: W = 191, z = 3.31, p = .001; 6 years: W = 98, z = 1.82, p = .069), and that no age group showed significant encoding of race (3 years: W = −54, z = −0.95, p = .344; 4 years: W = 22, z = 0.33, p = .744; 5 years: W = −21, z = −0.33, p = .727; 6 years: W = 60, z = 0.97, p = .334).
Race condition

Note: Reported rs are Pearson’s product momentum correlation coefficients +p < .10; *p < .05.

Correlations

Table 1 displays information about relations between measures. The only significant correlations were between race encoding and diversity: Participants in more racially diverse environments were more likely to misattribute facts within (rather than between) racial categories. To test whether age (rather than diversity) might account for these effects, we tested two additive linear models with participant age (3, 4, 5, or 6 years of age) and environmental racial diversity as predictors (adding interaction terms did not significantly improve the fit of either model, all ps > .396). In our first model, the percentage of White people in children’s schools/childcare was a negative predictor of race encoding (b = -0.05, t(78) = -2.37, p = .020), but age category was not a significant predictor (all ps > .404). Similarly, our second model revealed that the percentage of White people in children’s neighborhoods negatively predicted race encoding (b = -0.04, t(85) = -2.08, p = .041), but age category did not (though 6-year-old participants showed marginally stronger race encoding than did 3-year-old participants, t(85) = 1.67, p = .099; all other ps > .255).

Discussion

Replicating previous research (Aboud, 1988; Ruble et al., 2006), children in the present study relied on both gender and race when selecting social partners. However, the encoding task revealed that participants were sensitive to gender, but not race, in their attempts to remember facts about individuals. These findings suggest two conclusions: First, young children do not automatically encode all available features of others, even if they are capable of perceiving these features. Second, gender may be a more fundamental category for children, not only relevant for choosing between social partners, but also salient when encountering an individual.
Children’s social categories

Shutts, 2013, for review). For example, infants, toddlers, and preschoolers are more likely to accept objects that are offered or endorsed by same- or other-gender individuals, but are equally likely to accept objects associated with same- and other-race individuals (Frazier, Gelman, Kaciroti, Russell & Lumeng, 2012; Kinzler & Spelke, 2011; Shutts, Banaji & Spelke, 2010; young children treat gender, but not race, as a natural and stable category (Kinzler & Dautel, 2012; Rhodes & Gelman, 2009); and gender serves as a more robust guide to children’s friendship decisions in the preschool years than does race (Shutts et al., 2013). Further, when asked to infer an ad hoc categorization scheme (e.g. why an experimenter is putting stickers on some photographs but not others), children between 3 and 8 years of age are more successful when categorization involves gender rather than race (McGraw, Durm & Durnam, 1989; McGraw, Durm & Patterson, 1983). The present study aligns with this growing body of research, and reveals that the relative importance of gender over race emerges even when children spontaneously encounter individuals (as opposed to engaging in explicit comparisons or reasoning).

Why might gender be a more powerful social category than race for young children in these studies? As noted earlier, one possibility is that humans are born with cognitive machinery dedicated to tracking gender, but not race (Cosmides et al., 2003). Another possibility, however, is that children’s social environments emphasize gender more than race. For example, adults regularly use gender labels and may rely on gender categories to organize classrooms and playgroups; such practices may highlight gender distinctions for children (e.g. Hilliard & Liben, 2010). In contrast, White parents are often reluctant to talk about race with their children (Pahlke, Bigler & Suizzo, 2012), and many teachers feel uncomfortable leading discussions about race in their classrooms (Bolgatz, 2005).

In order to explore the merits of evolutionary and socialization explanations for children’s gender encoding in particular, it would be useful to develop automatic encoding tasks that are manageable for younger children (who have limited experience with gender labels and other features of socialization). Three-year-old children in the present study did not automatically encode gender, but their high error rates suggest that the task may simply have been too difficult for them. Future research might also include children who have different experiences with gender in their early social environments, such as children living in households with two parents of the same gender, or those attending ‘gender-free’ preschools where teachers use gender-neutral language and work to combat gender stereotyping. Finding that gender encoding appears very early in development and develops similarly in different environments would lend credence to the proposal that it is supported by an innate system. At minimum, such research would shed light on the origins and robustness of children’s gender encoding.

What causes racial categories to rise to such prominence that they come to be encoded automatically? The pattern of correlations in the present study between parents’ reports of environmental diversity and children’s performance on the race encoding task provides some preliminary evidence that exposure to racial diversity may influence race encoding. One possibility is that simply seeing more racial variation increases children’s attention to race. Alternatively, social and cultural contexts may lead children and adults to see race as a meaningful distinction and encode it automatically. For example, features of society (e.g. racial segregation, race-based disparities in wealth holdings) may lead children to think of race as a socially meaningful grouping variable (Bigler & Liben, 2007), and children in diverse environments may be exposed to this information earlier or more frequently than children in more racially homogenous environments. Because measuring children’s exposure to such information is difficult, it may be most fruitful to conduct research that varies children’s exposure to information about potential social categories under controlled conditions in the laboratory.

One particularly important direction for future studies is the inclusion (and direct comparison) of participants with more or less exposure to racial diversity, as well as the inclusion of participants from different racial groups. Beyond testing the generalizability of the present findings, such research could illuminate whether and how different social experiences might affect the emergence and development of race encoding. African American children, for example, typically hear more conversations about race and have more exposure to racial discrimination than White children in the US (e.g. Dulin-Keita, Hannon, Fernandez & Cockerham, 2011; Hughes, Rodriguez, Smith, Johnson, Stevenson et al., 2006). These experiences, as well as others (e.g. frequent exposure to racial outgroup members), could lead African Americans to encode race earlier or more robustly than their White peers.

Seeing a person as a member of a social category is a requisite step in treating that person according to the prejudices and stereotypes associated with that category: If one’s first and foremost impression of a person is his or her group membership, one may quickly make false assumptions about that person’s character, abilities, lifestyle, or potential. Understanding what causes race – or any other social category – to become automatically encoded could therefore be useful in guiding attempts to
ameliorate category-based judgments, reduce social bias, and encourage people to see and treat each other as individuals.

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References


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**Supporting Information**

Additional Supporting Information may be found in the online version of this article:

Additional Information on Study Materials