Published in final edited form as:
Dev Sci. 2015 November ; 18(6): 1036–1043. doi:10.1111/desc.12269.

Young Children's Automatic Encoding of Social Categories

Kara Weisman, **Marissa V. Johnson**, and **Kristin Shutts**
Department of Psychology, University of Wisconsin–Madison

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 six-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.

Keywords

social categories; children; race; gender; encoding

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 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

Correspondence concerning this article should be addressed to Kristin Shutts, Department of Psychology, University of Wisconsin-Madison, 1202 West Johnson Street, Madison, WI 53706, kshutts@wisc.edu, phone: 608-265-8949; or to Kara Weisman, Department of Psychology, Stanford University, 450 Serra Mall, Stanford, CA 94305, kweisman@stanford.edu, phone: 650-725-2400.
Kara Weisman is now in the Department of Psychology, Stanford University. Marissa V. Johnson is now in the Department of Education, University of North Carolina–Charlotte.

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 ostensibly has nothing to do with social categories. Over 30 years ago, Taylor and colleagues (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, Kurzban, & Tooby, 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 U.S. children encoded both the gender and race of unfamiliar individuals with equal strength, and Bennett and colleagues (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 and colleagues (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 comprised of 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 three to six 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 cateogries in the encoding task). Finally, we asked parents to report the racial composition of children' 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 three- to six-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 U.S. where the population is 79% White and 7% Black (U.S. 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 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, $t(95) = 5.15$, $p < 0.001$), while those in the race condition did not (*M* adjusted error difference score = 0.07, $t(95) = 0.22$, $p = 0.830$). Participants were equally likely to make within-category errors involving children of their own gender vs. children of the other gender ($t(95) = 0.20$, $p = 0.843$); they were also equally likely to make within-category errors involving Black vs. White children ($t(95) = -0.80$, $p = 0.424$). A 2 (participant gender) × 4 (participant age) × 2 (condition) ANOVA revealed only a main effect of condition ($F(1,176) = 10.77$, $p = 0.001$; all other *p*s > 0.512).

Wilcoxon signed rank tests (with continuity correction) confirmed that participants made disproportionately more within- than between-category errors in the gender condition ($W = 1999$, $z = 4.70$, $p < 0.001$), but not in the race condition ($W = -2$, $z = -0.01$, $p = 0.996$). Mann-Whitney-Wilcoxon rank sum tests (with continuity correction) confirmed that error difference scores differed significantly by condition ($U = 5810$, $z = 3.12$, $p = 0.002$). Figure 1 presents performance by participants at each age in each condition.

Preferences

Participants preferred same-gender children (Chance = 0.50, $M = 0.80$, $t(95) = 12.58$, $p < 0.001$) and White children ($M = 0.67$; $t(95) = 6.07$, $p < 0.001$). An ANOVA with participant gender, age, and condition as factors revealed main effects of condition ($F(1,176) = 11.29$, $p = 0.001$) and participant gender ($F(1,176) = 7.80$, $p = 0.006$): 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: $t(47) = 12.33$, $p < 0.001$; boys: $t(47) = 6.83$, $p < 0.001$) and White children (girls: $t(47) = 7.68$, $p < 0.001$; boys: $t(47) = 2.29$, $p = 0.027$).

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).

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 theses correlations, 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 *p*s > 0.396). In our first model, the percentage of White people in children's schools/childcares was a negative predictor of race encoding ($b = -0.05$, $t(78) = -2.37$, $p = 0.020$), but age category was not a significant predictor (all *p*s > 0.404). Similarly, our second model revealed that the percentage of White people in children's neighborhoods negatively predicted race encoding ($b = -0.04$, $t(85) = -2.08$, $p = 0.041$), but age category did not (though six-year-old participants showed marginally stronger race encoding than did three-year-old participants, $t(85) = 1.67$, $p = 0.099$; all other *p*s > 0.255).

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.

One previous study reported race encoding in children as young as five years of age (Bennett & Sani, 2003), whereas neither five- nor six-year-old children encoded race in the present research. Why might this be? It is worth noting that a group of eight-year-old children presented with our stimuli and procedure did show automatic encoding of race (see Supporting Information), indicating that our method is capable of detecting race encoding in children. This leaves open the possibility that the contradictory findings might be due to differences in social contexts (Britain vs. Midwestern U.S.), stimuli, or experimental procedures. In Bennett and Sani's race encoding study, children learned the names of all of the targets and read personal facts about each target aloud (e.g., "I like it when we visit my grandparents"). The present study, by contrast, involved a simpler, more streamlined experience for participants: Children were asked to associate pictures of animals with highly controlled pictures of targets (all of whom were nameless, wore gray shirts, and engaged in the same activity—seeing animals at the zoo). Bennett and Sani's procedure may have given children more time and motivation to process information about targets more deeply, thereby supporting race encoding even in young children. Further research is necessary to investigate how different procedures affect children's encoding of social categories. Importantly, the present study is the first to test young children's gender and race encoding with identical procedures; in this initial attempt at a direct comparison, gender was encoded more robustly than race.

Gender and race are both perceptible to infants by three to four months of age (see Quinn et al., 2011, for review), and so it is somewhat surprising that our (much older) participants were more attuned to individuals' gender than to their race. However, the present findings are in accordance with mounting evidence that gender is a more meaningful social distinction than race early in development (see Kinzler, Shutts, & Correll, 2010, and Shutts, 2013, for review). For example, infants, toddlers, and preschoolers are more likely to accept objects that are offered or endorsed by same- over other-gender individuals, but are equally likely to accept objects associated with same- and other-race individuals (Frazier et al., 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, Roben, & Spelke, 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 three and eight 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 generalizabilty 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 U.S. (e.g., Dulin-Keita, Hannon, Fernandez, & Cockerham, 2011; Hughes, Rodriguez, Smith, Johnson, Stevenson, & Spicer, 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.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

We thank Katherine D. Kinzler, Elizabeth S. Spelke, and Ewart A.C. Thomas for providing helpful comments on a previous version of this manuscript, and Ashley Jordan, Karissa Propson, and Maddie Spencer for assistance with data collection. This research was funded by NICHD Grant R01HD07089053 to K.S., by internal grants from the University of Wisconsin-Madison to K.S., and by a William R. and Sara Hart Kimball Stanford Graduate Fellowship awarded to K.W. Infrastructure support was provided by the Waisman Center, University of Wisconsin-Madison, through the National Institute of Child Health and Human Development (P30HD03352).

References

Aboud, FE. Children and prejudice. Cambridge: Basil Blackwell; 1988.

Aboud FE, Skerry SA. The development of ethnic attitudes: A critical review. Journal of Cross-Cultural Psychology. 1984; 15:3–34.

Banaji, MR.; Gelman, S. Navigating the social world: What infants, children and other species can teach us. New York: Oxford University Press; 2013.

Bennett M, Sani F. The role of target gender and race in children's encoding of category-neutral person information. British Journal of Developmental Psychology. 2003; 21:99–112.

Bennett M, Sani F, Hopkins N, Agostini L, Malucchi L. Children's gender categorization: An investigation of automatic processing. British Journal of Developmental Psychology. 2000; 18:97–102.

Bigler RS, Liben LS. A cognitive-developmental approach to racial stereotyping and reconstructive memory in Euro-American children. Child Development. 1993; 64:1507–1518.

Bigler RS, Liben LS. Developmental intergroup theory: Explaining and reducing children's social stereotyping and prejudice. Current Directions in Psychological Science. 2007; 16:162–166.

Bolgatz J. Revolutionary talk: Elementary teacher and students discuss race in a social studies class. Social Studies. 2005; 96:259–264.

Cosmides L, Tooby J, Kurzban R. Perceptions of race. Trends in Cognitive Sciences. 2003; 7:173–179. [PubMed: 12691766]

Dulin-Keita A, Hannon L, Fernandez JR, Cockerham WC. The defining moment: children's conceptualization of race and experiences with racial discrimination. Ethnic and Racial Studies. 2011; 34:662–682. [PubMed: 21532908]

Dunham, Y.; Degner, J. From categories to exemplars (and back again). In: Banaji, MR.; Gelman, SA., editors. Navigating the social world: What infants, children, and other species can teach us. New York: Oxford University Press; 2013.

Fiske, ST.; Neuberg, SL. A continuum of impression formation, from category-based to individuating processes: Influences of information and motivation on attention and interpretation. In: Zanna, MP., editor. Advances in experimental social psychology. Vol. 23. New York: Academic Press; 1990. p. 1-74.

Frazier BN, Gelman SA, Kaciroti N, Russell JW, Lumeng JC. I'll have what she's having: The impact of model characteristics on children's food choices. Developmental Science. 2012; 15:87–98. [PubMed: 22251295]

Hilliard LJ, Liben LS. Differing levels of gender salience in preschool classrooms" Effects on children's gender attitudes and intergroup bias. Child Development. 2010; 81:1787–1798. [PubMed: 21077864]

Hughes D, Rodriguez J, Smith EP, Johnson DJ, Stevenson HC, Spicer P. Parents' ethnic-racial socialization practices: A review of research and directions for future study. Developmental Psychology. 2006; 42:747–770. [PubMed: 16953684]

Kinzler KD, Dautel JB. Children's essentialist reasoning about language and race. Developmental Science. 2012; 15:131–138. [PubMed: 22251299]

Kinzler KD, Shutts K, Correll J. Special issue article: Priorities in social categories. European Journal of Social Psychology. 2010; 40:581–592.

Kinzler KD, Spelke ES. Do infants show social preferences for people differing in race? Cognition. 2011; 199:1–9. [PubMed: 21334605]

Kowalski K, Lo Y. The influence of perceptual features, ethnic labels, and sociocultural information on the development of ethnic/racial bias in young children. Journal of Cross-Cultural Psychology. 2001; 32:444–455.

Kurzban R, Tooby J, Cosmides L. Can race be erased? Coalitional computation and social categorization. Proceedings of the National Academy of Sciences USA. 2001; 98:15387–15392.

McGraw KO, Durm MW, Patterson JN. Concept discrimination learning by preschool children using facial stimuli differing in age, sex, race, and eyeglasses. The Journal of General Psychology. 1983; 108:193–202. [PubMed: 6854283]

McGraw KO, Durm MW, Durnam MR. The relative salience of sex, race, age, and glasses in children's social perception. The Journal of Genetic Psychology. 1989; 150:251–267. [PubMed: 2809573]

Nelson, TD. Handbook of Prejudice, Stereotyping, and Discrimination. New York: Psychology Press; 2009.

Pahlke E, Bigler RS, Suizzo M. Relations between colorblind socialization and children's racial bias: Evidence from European American mothers and their preschool children. Child Development. 2012; 83:1164–1179. [PubMed: 22537347]

Quinn PC, Anzures G, Izard CE, Lee K, Pascalis O, Slater AM, Tanaka JW. Looking across domains to understand infant representation of emotion. Emotion Review. 2011; 3:197–206. [PubMed: 21572929]

Ramsey PG, Myers LC. Salience of race in young children's cognitive, affective, and behavioral responses to social environments. Journal of Applied Developmental Psychology. 1990; 11:49–67.

Rhodes M, Gelman Susan A. A developmental examination of the conceptual structure of animal, artifact, and human social categories across two cultural contexts. Cognitive Psychology. 2009; 59:244–274. [PubMed: 19524886]

Ruble, DN.; Martin, CL.; Berenbaum, SA. Gender development. In: Damon, W.; Eisenberg, N., editors. Handbook of Child Psychology. 6th edn. Vol. 3. New York: Wiley; 2006. p. 858-931.

Shutts. Is gender 'special'?. In: Banaji, MR.; Gelman, SA., editors. Navigating the Social World: What Infants, Children, and Other Species Can Teach Us. New York: Oxford University Press; 2013. p. 297-300.

Shutts K, Banaji M, Spelke ES. Social categories guide young children's preferences for novel objects. Developmental Science. 2010; 13:599–610. [PubMed: 20590724]

Shutts K, Roben C, Spelke ES. Children's use of social categories in thinking about people and social relationships. Journal of Cognition and Development. 2013; 14:35–62. [PubMed: 23646000]

Susskind JE. Preadolescents' categorization of gender and ethnicity at the subgroup level in memory. British Journal of Developmental Psychology. 2007; 25:213–225.

Taylor SE, Fiske ST, Etcoff NL, Ruderman AJ. Categorical and contextual bases of person memory and stereotyping. Journal of Personality and Social Psychology. 1978; 36:778–793.

U.S. Census. State & County QuickFacts: Madison (city), Wisconsin [Data set]. 2010. Retrieved from http://quickfacts.census.gov/qfd/states/55/5548000.html

Waxman SR. Names will never hurt me? Naming and the development of racial and gender categories in preschool-aged children. European Journal of Social Psychology. 2010; 40:593–610.

Yee M, Brown R. The development of gender differentiation in young children. British Journal of Social Psychology. 1994; 33:183–196. [PubMed: 8044502]

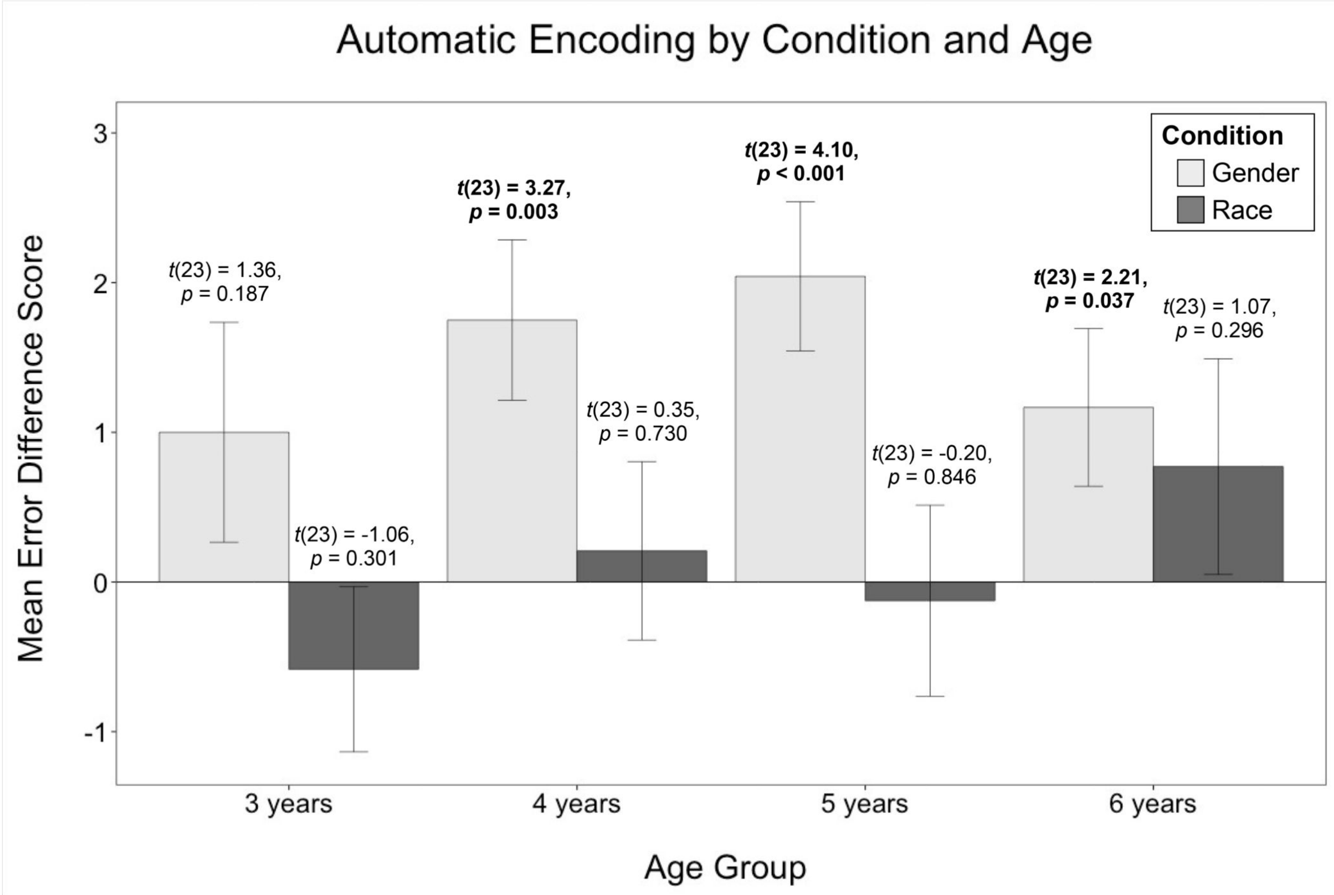

Figure 1.
Mean adjusted error difference scores at each age in each condition. One-sample t-tests to chance (0) appear above each bar in the graph. Error bars depict standard error. Wilcoxon signed rank tests confirmed that children encoded gender as early as four years of age (3 years: $W = 63$, $z = 1.17$, $p = 0.243$; 4 years: $W = 150$, $z = 2.79$, $p = 0.005$; 5 years: $W = 191$, $z = 3.31$, $p = 0.001$; 6 years: $W = 98$, $z = 1.82$, $p = 0.069$), and that no age group showed significant encoding of race (3 years: $W = -54$, $z = -0.95$, $p = 0.344$; 4 years: $W = 22$, $z = 0.33$, $p = 0.744$; 5 years: $W = -21$, $z = -0.35$, $p = 0.727$; 6 years: $W = 60$, $z = 0.97$, $p = 0.334$).

Table 1

Correlations Between Measures

	Environmental racial diversity				
	Neighborhood		Childcare setting		
	% White	**% Black**	**% White**	**% Black**	**Preference scores**
Gender condition					
Error difference scores	$r = -0.01$ ($p = 0.953$)	$r = 0.04$ ($p = 0.729$)	$r = -0.17$ ($p = 0.150$)	$r = 0.09$ ($p = 0.476$)	$r = -0.01$ ($p = 0.950$)
Preference scores	$r = 0.02$ ($p = 0.880$)	$r = -0.14$ ($p = 0.209$)	$r = -0.06$ ($p = 0.619$)	$r = 0.10$ ($p = 0.419$)	–
Race condition					
Error difference scores	$r = -0.21$+ ($p = 0.051$)	$r = 0.24$* ($p = 0.022$)	$r = -0.30$* ($p = 0.005$)	$r = 0.25$* ($p = 0.021$)	$r = 0.03$ ($p = 0.736$)
Preference scores	$r = -0.03$ ($p = 0.813$)	$r = -0.05$ ($p = 0.655$)	$r = -0.10$ ($p = 0.381$)	$r = 0.13$ ($p = 0.232$)	–

Note. Reported *r*s are Pearson's product momentum correlation coefficients.