Developing gender- and race-based categories in infancy

In G. Hayes & M. Bryant (Eds.), *Psychology of Culture*. In *Psychology of Emotions, Motivations and Actions: Focus on Civilizations and Cultures* Series. Hauppauge, NY: Nova Science Publishers.

Developing gender- and race-based categories in infants:

Evidence from 7- and 11-month-olds

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This research was supported by NIH grant HD30410 to SRW and by an NSF Graduate Research Fellowship to ADG. We thank the members of the Project on Child Development for assistance with data collection and S. Arunachalam and S. Hespos for discussion. Special thanks go to the children and families who participated in this work.

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Abstract

As adults, our social categories are flexible and abstract. We establish gender categories that include individuals from different racial groups, and racial categories that include individuals of both genders. But how do representations like these develop? In this chapter, we review the literature on infants' sensitivity to race and gender categories, and then offer new evidence concerning 7- and 11-month-old US infants' developing appreciation of social categories (gender; race). At issue is whether they appreciate gender- and race-based categories, and if so, how abstract these categories might be. During habituation, infants viewed a set of individual faces, all from the same racial and gender category (e.g., all White females). At test, they viewed two new faces, selected to assess the breadth of their social categories. At both 7 and 11 months, infants revealed an appreciate of gender categories (female, male) that were sufficiently abstract to include individuals from different racial groups (e.g., they included both black an white individuals in their category of females). The pattern for racial categories was different. At 11 months, infants revealed an appreciate of race-based categories (white, black) that were sufficiently abstract to include individuals from different gender groups (e.g., they included both females and males in their category of White). At 7 months, infants showed no such appreciation of race-based categories. This research opens several new avenues for research in this key area. In discussion these avenues, we highlight the role of experience in the development of social categories and underscore the importance of extending the developmental research to include infants and young children raised in a more diverse set of circumstances that reflect more fully the range of human social experience.

Introduction

For infants and young children growing up across the world's communities, an essential task is to recognize key individuals (e.g., a cousin, a favorite sippy-cup) and to form categories that link these individuals to other members of the same kind (e.g., other children, other cups). Most developmental research on categories is focused on categories of *objects* (e.g., cup, dog). But more recently, researchers have considered infants' sensitivity to categories of *people*. This work has begun to bring fundamental issues in object categorization into contact with issues in social categorization.

There is no doubt that as adults, we recognize that *people* can vary along a number of different dimensions, including gender, racial group, political affiliation, occupation, and age. As we consider any one of these dimensions, our representations are sufficiently abstract to include individuals that vary along the others. For example, the category *female* is sufficiently abstract to include Hillary Clinton, Aung San Suu Kyi, and Michelle Obama; the category *White person* is sufficiently abstract to include Hillary Clinton and Newt Gingrich. Moreover, as adults, the social categories that we form are flexible. We not only form broad gender-based categories (e.g., *female),* but also more specific categories (e.g., *White female*). This kind of flexibility is a hallmark of the human mind.

But what about infants and young children? Do infants also form social categories? And if so, are they flexible in the particular categories they form and in the range of individuals they include in each? Developmental questions like these are especially compelling because it is clear that the content of our social categories, especially those based on race and ethnicity, are not innately-given, but are instead social constructions. What this means, of course, is that these

categories must be tuned by infants' experience in their social worlds. Although the belief that the social world is comprised of distinct *kinds of people,* partitioned on the basis of race and ethnicity, enjoys scant scientific support, this belief is held deeply and universally. Moreover, this belief carries serious consequences: Social categories function essentially as "natural kinds", and like other natural kinds, they support strong inferences about members of those categories, including inferences about the capacities, intentions, and behaviors of individuals that we will never encounter in our direct experience.

In this chapter, we focus on infants' sensitivity to gender- and race-based categories within the first year of life. We review evidence documenting that infants and young children *notice* a range of physical features that will (later) become markers of social categories (e.g., skin color, hair-length, native language or accent, type of dress) and use these features to distinguish between individuals. We also ask how, in the natural course of development, infants and young children move beyond noticing that *individuals* vary along certain dimensions and begin to establish distinct *kinds of people* that vary along certain dimensions. We then present new evidence concerning infants' gender- and race-based social categories in the first year of life.

Early gender-based distinctions. There is little doubt that within the first year of life, infants are sensitive to the gender of individuals. By three months of age, infants prefer to look at female, as compared to male faces (Quinn, et al., 2002; Quinn, et al., 2008). This preference, which indicates that they can distinguish faces on the basis of gender, seems to be mediated by experience. For example, infants whose primary caregiver was a White female preferred female over male faces, but this preference was evident *only* when infants' choices were both White (that is, a White male vs a White female face); when their choices were both Asian (that is, an Asian male and an Asian female), faces with whom the infants were presumably less familiar,

they showed no preference at all (Quinn, et al., 2008). Additional evidence for the role of experience comes from research with 3-month-olds whose primary caregivers are male; these infants seem to prefer male over female faces (Quinn, et al., 2002).

Over the course of the first year of life, infants are not only sensitive to gender, but also begin to use gender as a basis for categorization. By 10 months, infants form gender categories that include individuals that vary over several dimensions, including variations in facial orientation, emotional expression, and hairstyle (Cohen & Strauss, 1979; Cornell, 1974; Leinbach & Fagot, 1993; Younger & Fearing, 1999). This ability to do so is impressive. But notice that variations like these can all occur within a given individual. Considered in this light, infants' ability to abstract over variation in facial orientation, emotional expression and hairstyle is essential because it permits them to identify key individuals, despite temporary changes in their appearance. What remains unanswered is whether infants are also able to abstract over more *enduring* differences, like those associated with race, differences that are stable across their lifespans.

Early race-based distinctions. The developmental progression underlying infants' attention to race appears to mirror the developmental progression for gender. At three months of age, infants are sensitive to race, and this sensitivity, like their sensitivity to gender, is influenced by their experience in their social world. Newborn infants show no preference for faces from one racial group over another, but by three months they exhibit reliable preferences for faces from a familiar, as compared to an unfamiliar, racial category (Bar-Haim, Lamy, Ziv, & Hodes, 2006; Kelly, et al., 2005; Kelly, et al., 2007). For example, White 3-month-olds prefer a White face, as compared to a Black, Asian, or Middle Eastern face (Bar-Haim, et al., 2006; Kelly, et al., 2005), and Chinese 3-month-olds prefer a Chinese face, as compared to a Black, White, or Middle

Eastern face (Kelly, et al., 2007). Bar-Haim and colleagues focused on Ethiopian infants to take this finding one step further: Ethiopian infants raised in Ethiopia (with exposure to only Black Ethiopian individuals) preferred Black over White faces, but Ethiopian infants raised in Israel (with exposure to both Black and White individuals) showed no such preference (Bar-Haim, et al., 2006).

By nine months of age, infants not only notice differences among individual faces, but also use these differences as a basis for race-based categorization. For example, after having been familiarized to a set of faces from one racial group (e.g., White females), 9-month-olds show a reliable preference for a female from a novel race-based category (e.g., an Asian female) over one from the familiar race-based category (e.g., a White female) (Anzures, et al., 2009). This suggests that 9-month-olds established a category of white females. What remains unanswered is whether they are also able to establish a more abstract category that includes White males and as well as females.

This review of the literature indicates that in the first year of life, infants are sensitive to distinctions that underlie race- and gender-based categories. By three months, infants reveal an experience-based visual preference for a familiar gender or racial group (Bar-Haim, et al., 2006; Kelly, et al., 2005; Kelly, et al., 2007; Quinn, et al., 2002). By nine to ten months, infants form visual categories based on either gender (Cohen & Strauss, 1979; Cornell, 1974; Leinbach & Fagot, 1993; Younger & Fearing, 1999) or racial group (Anzures, et al., 2009).

There is, nonetheless, a key limitation in the evidence to date: Infants' sensitivity to individuals' gender comes from experimental designs in which racial group has been held constant; likewise their sensitivity to individuals' race comes from experiments in which gender has been held constant. As a result, what remains unanswered is whether infants' appreciation of

gender is sufficiently abstract to include individuals that vary in racial group (e.g., Hilary Clinton and Aung San Suu Kyi are both females), and whether their appreciation of racial groups is sufficiently abstract to include individuals that vary in gender (e.g., Michele Obama and Stevie Wonder are both Black). In a series of four experiments, we address these questions directly.

Experiment 1: Gender-based categories at 11 months

The goal of Experiment 1 is to discover whether 11-month-olds' gender-based categories are sufficiently abstract to include individuals from different racial groups. We know that by 11 months, infants can establish gender-based categories within a single racial group; that is, they can form a category of White females (Leinbach & Fagot, 1993; Younger & Fearing, 1999). Importantly, however, there is no evidence about whether infants can also form more abstract gender categories that include individuals from different racial groups. In other words, can they establish a category *female* that is sufficiently abstract to include both White and Black females, or a category *male* that is sufficiently abstract to include both White and Black males?

To address this issue, infants were habituated to a series faces of different White individuals, all of the same gender (either all White females or all White males). At test, they viewed two new individuals, both of whom were Black (a Black female and a Black male). Because infants as young as three months notice racial differences between individuals (Bar-Haim, et al., 2005; Kelly, et al., 2005; Kelly, et al., 2007), we expected that our 11-month-olds would notice the change in racial group from habituation (White) to test (Black). If they do, they should look longer to both test faces (the Black female and the Black male), as compared to their last habituation trial (a White individual). In addition, our experimental design permitted us to go further. If infants' gender-based categories are sufficiently abstract to include individuals from *different* racial groups, this too should be evident at test: Infants habituated to White females

should prefer the Black male over the Black female at test. Conversely, infants habituated to White males should prefer the Black female over the Black male at test.

Participants

Twenty-four healthy, full-term infants (12 girls, mean age = 11 months, 1 day; range = 10 months, 17 days – 11 months, 14 days) were recruited from the greater Chicago area. For most infants, both parents self-identified as White (19); for 5 infants, one or two parents self-identified as Black (1) or Asian (4). Seven additional infants were excluded from the final sample for failure to meet habituation criteria (5) or parent interference (2).

Materials

Stimuli included 16 color photographs of smiling adult faces (Minear & Park, 2004; Tottenham, et al., 2009): six White females, six White males, two Black females, and two Black males. To minimize hair and clothing cues, each face was fitted within an oval outline (36 cm tall by 30 cm wide). See Figure 1. We created two sets of habituation stimuli (one with exclusively White female faces and the other with exclusively White male faces) and two pairs of test stimuli (each containing a Black female face and a Black male face). See Table 1.

Procedure

To begin the test session, infants were seated on a parent's lap, facing a presentation screen. Parents were instructed not to interfere at any time during the testing session and to close their eyes during the test trials. The procedure included a habituation phase followed immediately by a test phase. Infants were randomly assigned to one of two conditions; these differed only in the stimuli infants saw during habituation: Infants in the White female condition viewed exclusively White female faces during habituation; those in the White male condition

viewed exclusively White male faces during habituation. Infants in both conditions were treated identically at test.

On each habituation trial, infants viewed a series of single White face. A trial ended when the infant looked away for 2 s consecutively or once they had accumulated 120 s of looking. The habituation phase ended when the infant showed at least a 50% decline in looking from the first three to the last three trials, with a maximum of 16 trials. During the test phase, which immediately followed habituation, infants in the two conditions were treated identically. They viewed two Black individuals – one male and the other female – presented one at a time, in alternating fashion. Each test face was presented twice, yielding four test trials. Half of the infants in each condition viewed the familiar gender face first (that is, the face that matched the gender they had viewed during habituation); the others viewed the novel gender face first.

Coding.

Infants' looking behavior was coded online by two trained independent observers who were blind to condition and trial type. The average inter-observer agreement was 94%. For each infant, we calculated the total looking time for novel test trials and familiar test trials. In this experiment and all others reported in this chapter, 1) we report analyses based on the primary coder, and 2) because preliminary analyses revealed no main effects or interactions of test trial order or parents' race[1], these factors were collapsed in reported analyses.

Results

As predicted, and as is evident in Figure 2, infants did indeed detect the change in race from habituation (where they viewed exclusively White faces) to test (where they viewed exclusively Black faces). In the first pair of test trials, they looked significantly longer to both

faces than they had looked to their final habituation trial (novel gender test trial, $t(23) = 4.97$, $p < .001$; familiar gender test trial, $t(23) = 2.81$, $p = .010$).

We next asked whether infants' gender categories were sufficiently abstract to include both White and Black faces. If they did, then they should look longer at the test face from the novel gender category than from the gender category they viewed during habituation. An ANOVA with condition (2: White female or White male) as a between-participants factor and trial type (2: novel or familiar gender test trial) as a within-participants factor revealed that they did. There was a main effect of trial type, $F(1,22) = 5.96$, $p = .023$, $\eta^2 = .20$; infants did look longer to the novel ($M = 20.53$, $SD = 14.38$) than to the familiar ($M = 14.11$, $SD = 9.70$) test face. There were no other main effects and no interactions. This pattern was echoed in an analysis of individual infants' performance: Seventeen of the 24 infants (7 in the White female condition and 10 in the White male condition) looked longer at the novel test trial than at the familiar test trial, $p = .032$, binomial comparison.

Discussion

These results reveal that at 11 months, infants in our sample are sensitive to differences in race (as revealed by their recovery at test to both Black individuals), but can also abstract over this difference to establish gender categories that include individuals from different racial groups. To the best of our knowledge, this is the first evidence that in a gender categorization task, infants are able to abstract not only over the transient of sorts of variations that can occur *within* a given individual, but also over more stable variations that distinguish *between* individuals and endure across their lifespans.

Experiment 2: Race-based categories at 11 months

We next asked whether 11-month-olds' race-based categories are sufficiently abstract to include individuals of both genders. We know that by 11 months, infants are able to form a category of White females (Anzures, et al., 2009). What remains unanswered is whether they can also form race-based categories that are sufficiently abstract to include both males and females.

To address this question, we maintained the logic of Experiment 1. Infants were habituated to faces of different female individuals, all from the same racial group (either White females or Black females). At test, infants viewed two new individuals, both male (a White male and a Black male). Because infants as young as three months of age notice differences between individuals based on gender (Quinn, et al., 2002; Quinn, et al., 2008), we predicted that our 11-month-olds would notice the change in gender at test. If they do, they should look longer to both test faces (the White and Black male), as compared to their last habituation trial (a female). In addition, our experimental design permitted us to go further. If infants' race-based categories are sufficiently abstract to include individuals from *different* gender groups, this too should be evident at test: Infants habituated to White females should prefer the Black over the White male at test. Conversely, infants habituated to Black females should prefer the White over the Black male at test.

Participants

Thirty-two healthy, full-term infants (15 girls, mean age = 10 months, 29 days; range = 10 months, 17 days – 11 months, 15 days) were recruited from the greater Chicago area. For most infants, both parents self-identified as White (28); for 4 infants, one or two parents self-identified as Black (2) or Asian (2). Eight additional infants were excluded for failure to meet habituation criteria (5), fussiness (2), or experimenter error (1).

Materials

Stimuli included 16 color photographs of smiling adult faces (Minear & Park, 2004; Tottenham, et al., 2009): six White females (identical to those used in Experiment 1), six Black females, two White males, and two Black males (identical to those used in Experiment 1). Each face was presented within an oval, as in Experiment 1. We created two sets of habituation stimuli (one including exclusively White females and the other exclusively Black females) and two sets of test stimuli (each including a White male face and a Black male face). See Table 1.

Procedure

The procedure was identical to Experiment 1; the only difference was in the materials infants viewed. During habituation, infants in the White female condition viewed exclusively White female faces; those in the Black female condition viewed exclusively Black female faces. At test, infants in both conditions viewed two new faces, a White male and a Black male.

Coding

The coding was identical to Experiment 1. Average inter-observer agreement was 94%.

Results

As predicted, and as can be seen in Figure 3, infants detected the change in gender from habituation to test, looking significantly longer to the first test trials than they had looked in their final habituation trial (novel race test trial, $t(31) = 3.46$, $p = .002$; familiar race test trial, $t(31) = 2.64$, $p = .013$). In the next analysis, we went on to ask whether infants could nonetheless abstract over this difference in gender to establish racial categories that include individuals of both genders. For this analysis, we submitted infants' looking times at test to an ANOVA with condition (2: Black female or White female) as a between-participants factor and trial type (2: novel or familiar race test trial) as a within-participants factor. A main effect of trial type, $F(1,30) = 5.26$, $p = .029$, $\eta^2 = .15$, revealed that infants did indeed look longer to the novel (M =

17.06, *SD* = 12.65) than the familiar (*M* = 13.19, *SD* = 10.34) test object. There were no other main effects and no interactions. This pattern was also evident in an analysis of individual infants' performance: Twenty-three of the 32 infants (12 in the White female condition and 11 in the Black female condition) looked longer to the novel than to the familiar race at test, $p = .010$, binomial comparison.

Discussion

These results indicate that 11-month-old infants are sensitive to differences in gender, as revealed by their recovery at test to both male individuals, but are nonetheless able to abstract over this gender difference to establish racial categories that include both males and females.

Taken together, Experiments 1 and 2 show that 11-month-old infants can form abstract gender and racial categories: They include individuals from different racial groups in their gender categories and include individuals of both genders in the same racial category. In Experiments 3 and 4 we focus on 7-month-old infants to identify the developmental antecedents infants' categorization.

Experiment 3: Gender-based categories at 7 months

Here, we asked whether 7-month-old infants are able to form gender categories that are sufficiently abstract to include individuals from different racial groups. We focused on 7-month-olds because they appear to be at an important developmental juncture. Although there is some evidence that 7-month-olds successfully form gender-based categories (Cohen & Strauss, 1979; Cornell, 1974), the literature also includes reports of null effects (Leinbach & Fagot, 1993; Younger & Fearing, 1999). Mindful of these matters, we reasoned as follows: If 7-month-old infants are able to form gender categories that are sufficiently abstract to include individuals from different racial groups, then they should notice the change in race from habituation to test

trials, but should abstract over this difference to form a gender-based category (that is, to form a category *female* that includes both White and Black individuals). Moreover, because there is evidence that at this age, infants exhibit a processing advantage for female (over male) faces (Lee, et al., 2009; Ramsey, et al., 2005; Ramsey-Rennels & Langlois, 2006; Rubenstein, et al., 1999), we suspected that they might be more likely to establish gender categories if they were habituated to female than to male faces.

Participants

Thirty-two healthy, full-term infants (13 girls; mean age = 7 months, 1 day; range = 6 months, 9 days – 7 months, 24 days) were recruited from the greater Chicago area. Parents of all infants self-identified as White. Six additional infants were excluded for failure to meet habituation criterion (2), fussiness (1), or experimenter error (3).

Materials, procedure and coding

These were identical to Experiment 1. Average inter-observer agreement was 94%.

Results

As predicted, and as can be seen in Figure 4, 7-month-olds detected the change in race from habituation to test, looking significantly longer to the first test trials than they had looked to their last habituation trial (novel gender test trial, $t(31) = 4.28$, $p < .001$; familiar gender test trial, $t(31) = 2.20$, $p = .036$). We next asked whether 7-month-olds were able to abstract over this difference in race to establish gender categories that include both Black and White individuals. An ANOVA with condition (2: White female or White male) as a between-participants factor and trial type (2: novel or familiar gender test trial) as a within-participants factor revealed a main effect of condition, $F(1,30) = 5.21$, $p = .030$, $\eta^2 = .15$: Infants in the White female condition ($M = 32.22$, $SD = 16.43$) looked longer during test than infants in the White male

condition (M = 20.89, SD = 11.49). This main effect was a qualified by a marginal condition by trial type interaction, $F(1,30) = 3.59$, $p = .068$, $\eta^2 = .10$. To pursue this interaction, we conducted a test of simple effects in each condition. As predicted, infants in the White female condition looked longer to the novel (M = 19.22, SD = 13.33) than to the familiar (M = 13.11, SD = 7.69) gender test trials, $p = .036$, but their counterparts in the White male condition did not (novel gender: M = 9.77, SD = 5.83; familiar gender: M = 11.13, SD = 7.38, $p = .630$). This pattern was mirrored in individual infants' performance: Seventeen of the 32 infants (12 in the White female condition, but only 5 in the White male condition) looked longer at the novel test trial than at the familiar test trial, $p = .430$, binomial comparison.

Discussion

These results provide the first evidence that 7-month-old infants are able to form a category of *female* that is sufficiently broad to include individuals from different racial groups. There was no evidence that the same was true for the category of *male*. This outcome is consistent with reports of infants' processing advantage for female faces (Lee, et al., 2009; Ramsey, et al., 2005; Ramsey-Rennels & Langlois, 2006).

Experiment 4: Race-based categories at 7 months

Finally, we asked whether 7-month-old infants are able to form racial categories that are sufficiently abstract to include individuals of both genders. Recall that by three months, infants exhibit reliable preferences for faces from a familiar, as compared to an unfamiliar, racial category (Bar-Haim, et al., 2006; Kelly, et al., 2005; Kelly, et al., 2007), and that between six and nine months, infants begin to establish categories based on race under certain conditions (Anzures, et al., 2009). For example, when they are presented with arrays of female faces, they are able to form distinct categories of White versus Asian female faces (Anzures et al., 2009).

This outcome, coupled with their processing advantage for female over male faces, suggests that if 7-month-olds were able to form abstract racial categories at all, they would be more likely to do so when they were habituated to female than to male faces.

To test this hypothesis, we adopted the same materials and procedure as Experiment 2, reasoning as follows: If infants form racial categories that are sufficiently abstract to include individuals of both genders, they should notice the change in the gender of faces from habituation to test trials, but should abstract over this difference to form a racially-based category (that is, to form a category for *White people* that includes both males and females).

There are several reasons to suspect that this might be an especially difficult task for 7-month-old infants. Chief among them is the matter of infants' experience with individuals from different racial groups. We know that infants' preferences and processing capacities are influenced by their social experience (Bar-Haim, Lamy, Ziv, & Hodes, 2006; Kelly, et al., 2005; Kelly, et al., 2007; Lee, et al., 2009; Quinn, et al., 2002; Quinn, et al., 2008; Ramsey, et al., 2005; Ramsey-Rennels & Langlois, 2006). Although infants typically encounter both male and female individuals in the daily course of their lives, it is unlikely that the primarily White infants who visit our lab (as well as in others') have such extensive interactions with individuals from different racial groups (see Rennels and Davis, 2008).

Participants

Thirty-two healthy, full-term infants (15 girls, mean age = 7 months, 1 day, range = 6 months, 21 days – 7 months, 14 days) were recruited from the greater Chicago area. For most infants, both parents self-identified as White (24); for 6 infants, one or two parents self-identified as Black (3), Asian (3); 2 parents did not self-identify. Three additional infants were excluded for failure to meet habituation criteria.

Materials, procedure and coding

These were identical to Experiment 2. Average inter-observer agreement was 95%.

Results

The results, depicted in Figure 5, indicate that infants did indeed detect the change in gender from habituation to test. They looked longer to the first test trials than to their last habituation trial (novel race test trial, $t(31) = 2.99$, $p = .005$); familiar race test trial, $t(31) = 1.84$, $p = .075$). We next asked whether infants are nonetheless able to abstract over this gender difference to establish racial categories that include individuals of both genders. An ANOVA with condition (2: White female or Black female) as a between-participants factor and trial type (2: novel or familiar race test trial) as a within-participants factor revealed no main effects or interactions. This null effect was echoed in individual infants' performance: Nineteen of the 32 infants (8 in the White female condition and 11 in the Black female condition) looked longer at the novel test trial than at the familiar test trial, $p = .189$, binomial comparison.

Discussion

These results offer no evidence that 7-month-old infants establish categories of race that include individuals of different genders. Although they were sensitive to differences in gender, as revealed by their recovery at test to both male individuals, 7-month-olds failed to abstract over gender to establish racial categories that include both males and females.

General Discussion

The evidence presented in this chapter offers new insight into the development of social categories in the first year of life. One caveat, of course is that our experimental work includes only infants raised in the US and primarily those raised in families that self-identify as White. We have found that in this population, by 11 months of age, infants are able to form gender

categories that are sufficiently abstract to include individuals from different racial groups (e.g. a category of *female* that includes both White and Black individuals) and racial categories that are sufficiently abstract to include individuals of both genders (e.g. a category of *White people* that includes both males and females). To the best of our knowledge, this constitutes the first demonstration that as they establish social categories, 11-month-olds are able to abstract over enduring differences, like race and gender. Evidence from the 7-month-olds reveals an intriguing developmental progression. These younger infants showed no evidence of being able to form abstract social categories based on race. But when it comes to establishing abstract social categories based on gender, the category *female* appears to serve as an important entry point: Seven-month-olds were able to form an abstract category of *female* (that includes both White and Black individuals), but failed to do so for the category *male*.

These results deepen our appreciation of the breadth of the social categories formed in infancy. They also raise several developmental questions of their own. For example, it will be important to identify the developmental processes underlying the emergence of abstract social categories between 7 and 11 months of age. Of course, it is possible that under different experimental conditions, 7-month-olds might reveal a sensitivity to a broader range of abstract social categories. However, the evidence reported here suggests that infants come to appreciate broad gender-based categories before they appreciate race-based categories). This has an intriguing parallel in recent work with preschool-aged children. The current consensus is that for young children, social categories based on gender may be more readily acquired and may hold greater inductive potential than those based on race (Dunham, Baron & Benaji (2008), Rhodes & Gelman, 2008; 2009; Shutts, Banaji, & Spelke, 2010; Ruble, Martin and Berenbaum (2006); Shutts, Kinzler, Katz, Tredoux & Spelke, 2011; Waxman, 2010).

This developmental decalage between gender and race is very likely related to infants' and young children's experience in the social world. After all, most infants and young children across the world's communities are exposed daily to members of both gender categories; the same may not be true for their exposure to individuals from diverse racial groups (Waxman, in press).

Observations like these challenge us to consider the role of social experience, and especially experience with members of different racial groups, in infants' and young children's emerging sensitivity to social categories. The magnitude of this challenge becomes especially clear when considered in light of the rather limited participant base upon which psychological research into the development of social categories has rested (Waxman, in press). The overwhelming majority of infants and young children who have participated in research concerning matters of race and gender are White infants living within White families, with (presumably) more extended exposure to other White individuals than to individuals from other racial groups. Despite our efforts to recruit a more diverse sample, the current experiments are no exception. We know that even within the first three months of age, infants' attention is tuned by their experience in the social world (Bar-Haim, et al., 2006; Kelly, et al., 2005; Kelly, et al., 2007; Lee, et al., 2009; Quinn, et al., 2002; Quinn, et al., 2008; Ramsey, et al., 2005; Ramsey-Rennels & Langlois, 2006). It is therefore reasonable to expect that their experience in the social world will continue to shape the social categories that older children form, as well as the inductive potential these categories hold (Shutts, Kinzler, Katz, Tredoux & Spelke, 2011;Waxman, 2010). If we are to understand how experience in the social worlds affect social categorization across development, it is essential that we broaden the empirical base beyond the primarily White infants and young children raised in primarily White families and communities.

Although infants' exposure within their social worlds will certainly have consequences on the social categories they form, we would be remiss if we did not also point out that infants' social categories are affected by more than mere visual exposure. Perhaps equally important are the contexts in which those individuals are encountered and the language we use to describe them. A recent experiment by Scott and Monesson (2009) serves as a case in point. These investigators exposed human infants to a set of distinct monkey faces. For half of the infants, each monkey face was introduced in conjunction with a distinct proper name; for the other infants, the same monkey faces were introduced in conjunction with a single common name. Although infants' visual exposure in the two conditions was held constant, infants hearing distinct names for each monkey face were more likely than those hearing a common name to distinguish among the individuals. In other words, infants' categorization and processing of faces is shaped not only by exposure to different individuals, but also by the types of experiences with those individuals, including the ways in which we name them. This powerful effect of naming has a long tradition in infants' and young children's categorization and individuation of objects (Waxman & Braun, 2005; Waxman & Markow, 1985) and in young children's and adults' reasoning about people (Birnbaum, Deeb, Segall, Ben-Eliyahu, & Diesendruck, 2010; Eberhardt, Dasgupta & Banaszynski, 2003; Gelman, Collmann, & Maccoby, 1986; Patterson & Bigler, 2006; Waxman, 2010).

In sum, in this chapter, we have shown that by seven months, infants have begun to partition their social world into distinct social categories. A key question for developmental research is to discover how these social categories, emerging in infancy and tuned by experience in the social world, come to serve as vessels for culturally-transmitted information about individuals and kinds of people. We have measures that are sufficiently sensitive to tap into these

categories in infants. But if we are to describe, predict and explain the development of social categories like those based on race, ethnicity or gender, how these are shaped by experience, and how they gain inductive force, it is essential that we broaden our reach to include infants and young children raised in a more diverse set of circumstances that reflect more fully the range of human social experience.

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Footnote

[1] Because so few infants came from families in which parents identified as Black or Asian, we were unable to use parent race as a factor in our analyses. We did, however, conduct a separate analysis including only those infants for whom both parents identified as White. In this experiment, and in all subsequent experiments, the results from this homogenous White sample were identical to those from the entire data set. We therefore report the results of analyses from the entire set.

Table 1

Summary of the stimuli for all experiments

Social category	Habituation Stimuli						Test Stimuli	
							Novel	Familiar
Gender (Experiments 1 & 3)								
White female condition	WF_1	WF_2	WF_3	WF_4	WF_5	WF_6	BM	BF
White male condition	WM_1	WM_2	WM_3	WM_4	WM_5	WM_6	BF	BM
Race (Experiments 2 & 4)								
White female condition	WF_1	WF_2	WF_3	WF_4	WF_5	WF_6	BM	WM
Black female condition	BF_1	BF_2	BF_3	BF_4	BF_5	BF_6	WM	BM

Note. W = White; B = Black; F = female; M = male. The White female (WF) and Black male (BM) faces were identical across all experiments.

Figure 1. A representative face from Experiments 1 – 4. All faces were fitted inside of an oval frame. Photos of faces were obtained from http://agingmind.cns.uiuc.edu/facedb/ (Minear & Park, 2004) and from http://www.macbrain.org/resources.htm (Tottenham, et al., 2009).

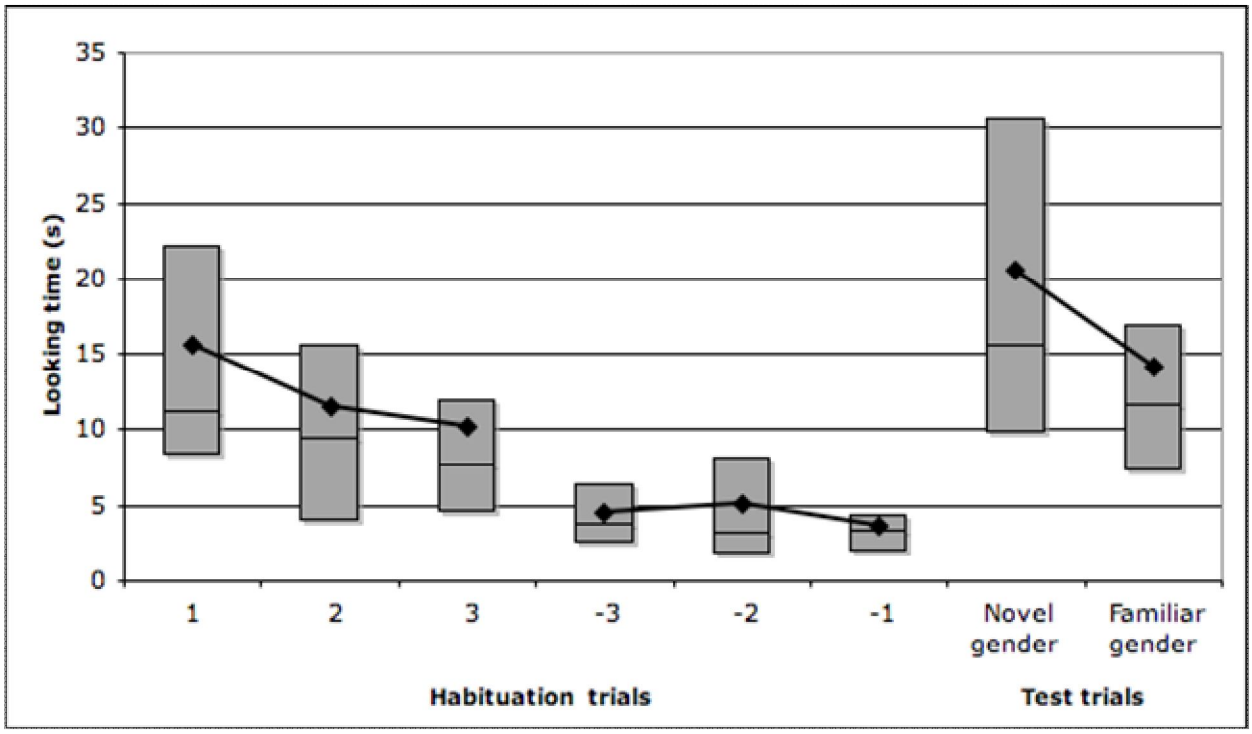

Figure 2. Experiment 1. Eleven-month-old infants' looking time across the first three habituation trials, the last three habituation trials, and the two types of test trials. Black diamonds represent the means, the central line in each box is the median, the lower line of each box is the first quartile, and the upper line of each box is the third quartile.

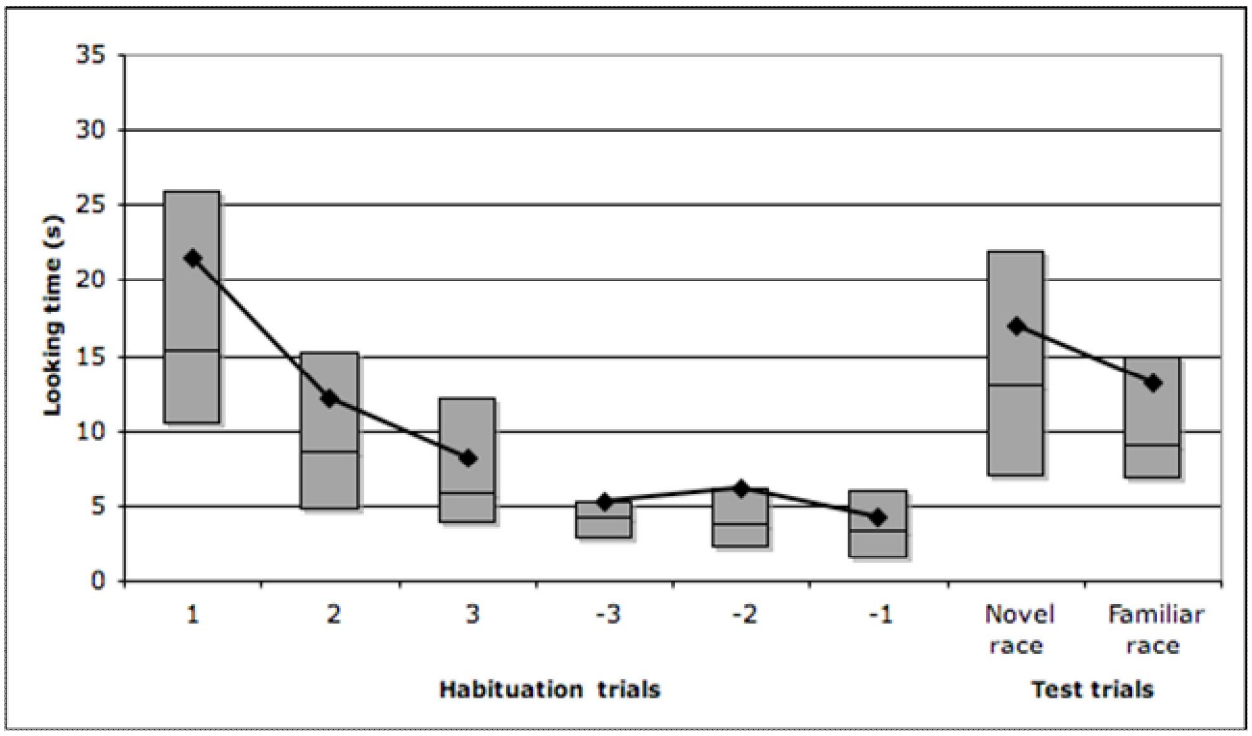

Figure 3. Experiment 2. Eleven-month-old infants' looking time across the first three habituation trials, the last three habituation trials, and the two types of test trials. Black diamonds represent the means, the central line in each box is the median, the lower line of each box is the first quartile, and the upper line of each box is the third quartile.

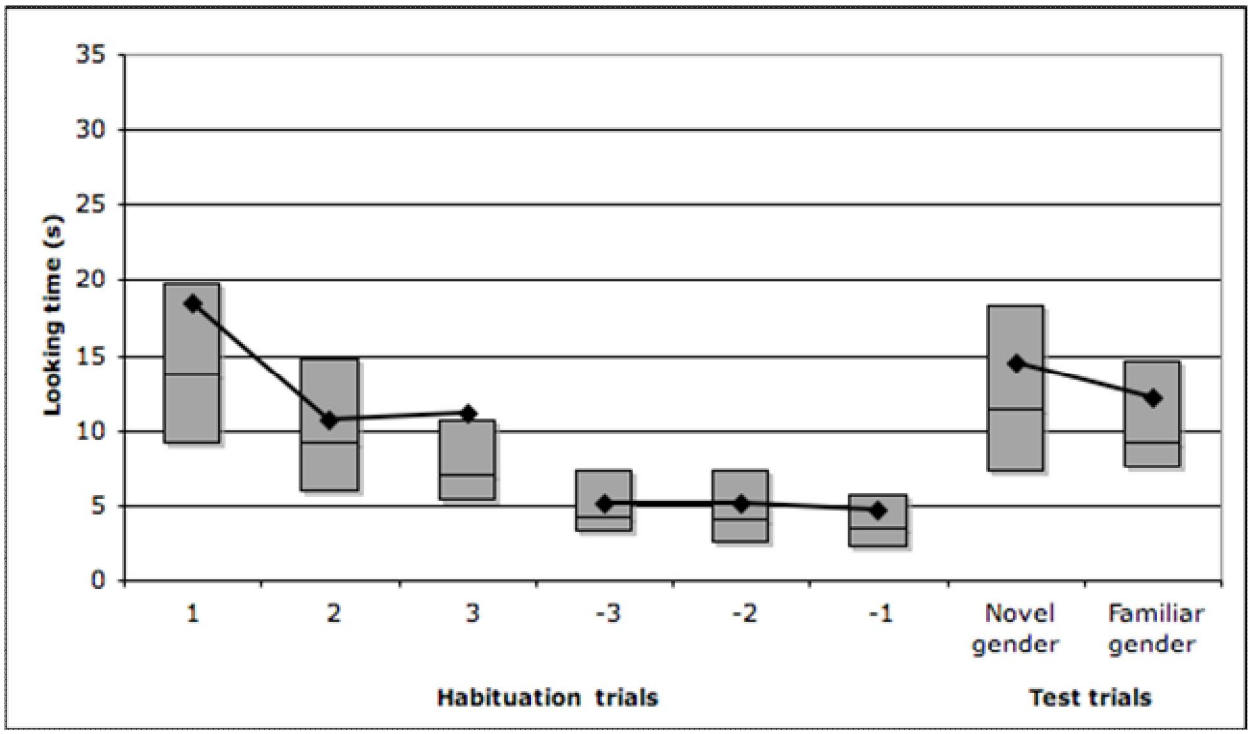

Figure 4. Experiment 3. Seven-month-old infants' looking time across the first three habituation trials, the last three habituation trials, and the two types of test trials. Black diamonds represent the means, the central line in each box is the median, the lower line of each box is the first quartile, and the upper line of each box is the third quartile.

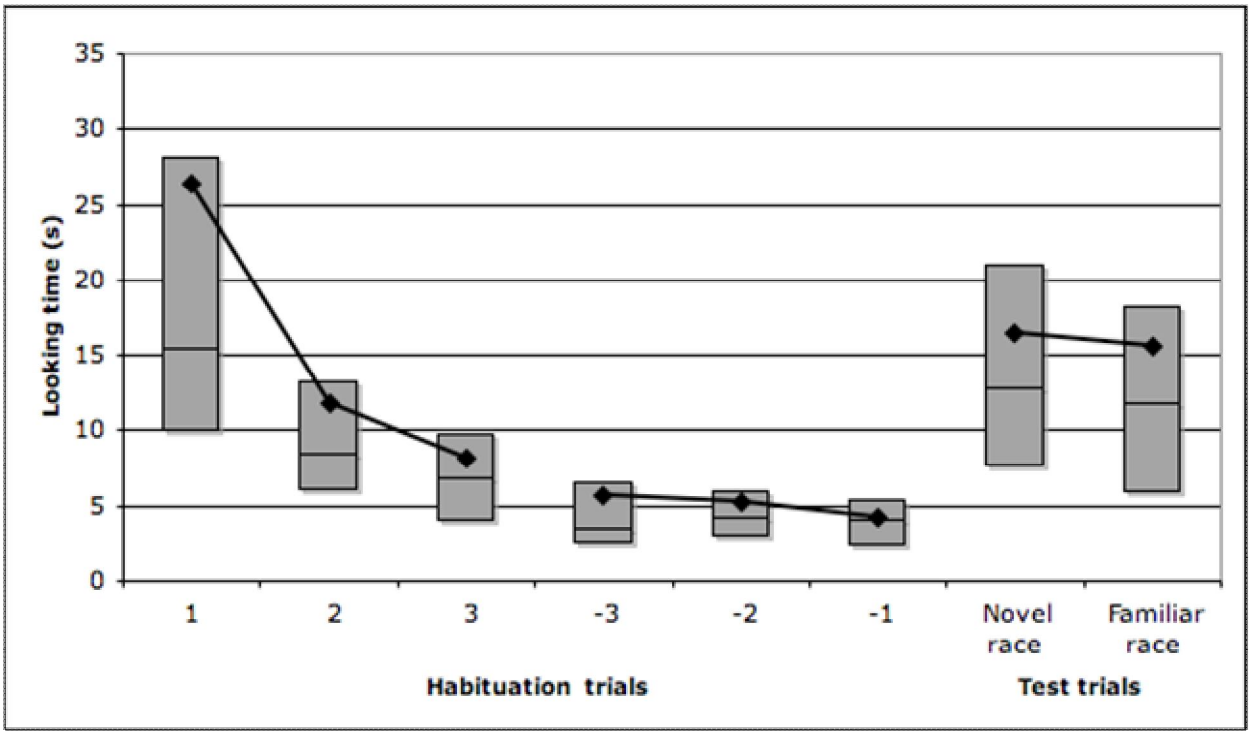

Figure 5. Experiment 4. Seven-month-old infants' looking time across the first three habituation trials, the last three habituation trials, and the two types of test trials. Black diamonds represent the means, the central line in each box is the median, the lower line of each box is the first quartile, and the upper line of each box is the third quartile.