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Foundations of infants' social group evaluations

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Abstract

Previous research has suggested that infants exhibit a preference for familiar over unfamiliar social groups (e.g., preferring individuals from their own language group over individuals from a foreign language group). However, because past studies often employ forced-choice procedures, it is not clear whether infants' intergroup preferences are driven by positivity toward members of familiar groups, negativity toward members of unfamiliar groups, or both. Across six experiments, we implemented a habituation procedure to independently measure infants' positive and negative evaluations of speakers of familiar and unfamiliar languages. We report that by 1 year of age, infants positively evaluate individuals who speak a familiar language, but do not negatively evaluate individuals who speak an unfamiliar language (Experiments 1 and 2). Several experiments rule out lower-level explanations (Experiments 3–6). Together these data suggest that children's early social group preferences may be shaped by positive evaluations of familiar group(s), rather than negative evaluations of unfamiliar groups.

RESEARCH HIGHLIGHTS

- Previous work with infants on the roots of social group preferences has not specifically distinguished between positivity toward one group and negativity toward the other group, thereby obscuring the origins of social group preferences.
- A habituation procedure was implemented to independently measure positive and negative evaluations of familiar and unfamiliar language groups among infants.
- Across six experiments we demonstrate that by the end of the first year of life, infants have formed a positive evaluation of speakers of a familiar language, but lack corresponding negativity toward speakers of unfamiliar languages.
- The origins of social group preferences may be rooted in a preference for the familiar, whereas negative attitudes toward dissimilar others may be acquired later, through greater experience with unfamiliar group members.

1 | INTRODUCTION

The persistence of discrimination and group-based conflict among adults across cultures (Allport, 1979; Brewer, 1979; Devine, 1989), as well as the noted difficulty in changing negative outgroup attitudes (Lai et al., 2014), has led some scholars to question whether intergroup bias is a natural disposition of human psychology. In other words, are we naturally inclined to positively evaluate people who are similar to ourselves, and despise those who are different? Or, are we "taught" to feel this way?

Research has demonstrated that children exhibit strong intergroup biases on measures such as peer-preference, moral judgments, explicit valuation, and pro- and anti-social behavior as early as 3 years of age (Dunham, Baron, & Carey, 2011; Patterson & Bigler, 2006; Raabe & Beelmann, 2011). Moreover, such biases are directed towards both conventional and arbitrary groups, supporting the contention that intergroup bias is a natural predisposition of our evolved psychology (Baron & Dunham, 2015; Dunham, Baron, & Carey, 2011). Based on the robust evidence that young children exhibit both implicit and explicit intergroup biases, researchers have turned to infancy to determine when and how such positive and negative intergroup biases first emerge (see, e.g., Bar-Haim, Ziv, Lamy, & Hodes, 2006; Kelly et al., 2005; Kinzler, Dupoux, & Spelke, 2007; Kinzler & Spelke, 2011; Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002).

In a seminal study, Kinzler and colleagues (Kinzler et al., 2007) explored whether infants prefer individuals from familiar language groups over individuals from unfamiliar language groups. Infants were

first familiarized to one individual speaking to them in their native language, and another individual speaking to them in a foreign language. During a subsequent silent test trial in which infants could gaze freely back and forth between the native and foreign language speakers, 6-month-old infants looked reliably longer to the individual who had spoken the language they were familiar with compared to the individual who had spoken the unfamiliar language. Other conditions demonstrated that older infants' evaluations of language speakers also influenced their social interactions: 10-month-olds preferentially accepted toys from familiar versus unfamiliar language speakers.

Together, these results clearly demonstrate that infants prefer speakers of familiar languages to speakers of unfamiliar languages early in life. But what is the nature of this preference? Indeed, it is currently unclear whether infants' preference is based upon a positive evaluation of a familiar individual, a negative evaluation of the unfamiliar individual (e.g., looking longer to a native than a foreign speaker because they dislike foreign speakers), or both (liking native speakers and disliking foreign ones; for a similar argument in the literature on children's explicit and implicit social group preferences using forced-choice procedures, see Bigler & Liben, 2007).

Addressing this issue is essential for understanding the early developmental roots of preference for members of familiar language groups specifically, but critically may also inform our understanding of the origins of intergroup bias more generally. Indeed, previous work has demonstrated that a tendency to like ingroup members precedes and/or is stronger than a tendency to dislike outgroup members in childhood (Aboud, 2003; Buttelmann & Böhm, 2014; see Brewer, 1999, for a review). Therefore, further investigation of the developmental trajectory of intergroup bias beginning in infancy is necessary, as this can shed light on whether this asymmetry is a fundamental feature of how humans assess group members.

Recent work has begun to investigate whether infants have formed evaluative representations of social groups (Xiao et al., 2017). In this study, infants' total looking time to a sequence of trials alternating own race (or other race) faces with positively (or negatively) valenced music was measured. The authors concluded that 9-month-old (but not 6-month-old) infants associate own race faces with positivity, and other race faces with negativity, because infants looked longer to a sequence of trials in which own race faces alternated with positively valenced music, and to a sequence of trials in which other race faces alternated with negatively valenced music. However, it is unclear why an overall increase in looking over a sequence of trials demonstrates (a) that infants are able to categorize individuals based on race, and (b) that racial categories are differentially evaluated. Indeed, infants' looking times can be influenced by a variety of factors such as familiarity, novelty and complexity (see Houston-Price & Nakai, 2004, for a review), which in some contexts can result in an increase in looking by infants, and in others, a decrease (Baron, 2013). Indeed, no evidence to date suggests that combining infants' looking times across two separate categories reliably measures infants' categorical processing of and evaluative associations of social groups (e.g., there's no demonstration that longer looking time, compared with shorter looking time to object stimuli reflects successful object categorization). Consequently, there may be a variety of explanations for this difference in looking time that requires further study. Given the ambiguity in the interpretation of these results, it is unclear whether the data from this single experiment can reveal anything about the foundation of social group evaluations.

The present study systematically examined whether infants' preference for familiar over unfamiliar language users is based upon a positive evaluation of those who speak familiar languages, a negative evaluation of those who speak unfamiliar languages, or both. To address this, and in contrast to Xiao et al. (2017), we employed a habituation procedure in an attempt to independently measure positive and negative evaluations of those who speak familiar and unfamiliar languages. Habituation has long been used to measure infants' rate of processing in both cognitive and perceptual domains (see Sirois & Mareschal, 2004). One major theory of the tendency to habituate to repeated stimuli is that habituation reflects a process of matching external stimuli to one's internal cognitive representations (Sokolov, 1963). Thus, to the extent that external stimuli are simpler or more consistent with one's pre-existing representations, the matching process should proceed more quickly than if the external stimuli are more complex or less consistent with those representations. Supporting this theory, infants have been shown to habituate faster to sequences of stimuli that are simple and easy to process, and slower to habituate to sequences of stimuli that are more complex and challenging to process (Cohen, DeLoache, & Rissman, 1975; Colombo, Frick, & Gorman, 1997; MacPherson, & Hamlin, 2014; McCall & Kagan, 1970; see review in Colombo & Mitchell, 2009; see also Dannemiller, 1984; Kidd, Piantadosi, & Aslin, 2012).

In addition, past work shows infants are capable of "matching" congruent visual and auditory stimuli, such as facial and vocal expressions (e.g., happy or sad) (Spelke, 1976; Walker-Andrews, 1986) as well as detecting categorical congruency between different modalities. For example, infants look longer to attractive faces when hearing positive auditory stimuli (e.g., laughing), but look longer to unattractive faces when hearing negative auditory stimuli (e.g., crying) (Rubenstein & Langlois, 2000). This suggests that infants are capable of evaluatively categorizing faces, and that they associate attractive faces with positivity and unattractive faces with negativity.

Our habituation procedure bears conceptual similarity to the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT has been used extensively with children and adults to measure evaluative associations with social groups, and is predicated on the logic that evaluatively congruent stimuli are easier (and thus faster) to pair together than evaluatively incongruent stimuli (Baron, 2015; Baron & Banaji, 2006; Dunham, Baron, & Banaji, 2008; Fazio & Olson, 2003; Heiphetz, Spelke, & Banaji, 2013; Nosek et al., 2007). That is, if participants implicitly evaluate members of one group (for instance, their ingroup) more positively than members of another group (for example, an outgroup), then they will be faster to respond when positive adjectives are paired with ingroup members, as opposed to outgroup members. Similarly, if participants implicitly evaluate outgroup members as more negative than members of their ingroup, then they will be faster to respond when negative adjectives are paired with outgroup members, as opposed to ingroup members.

Based on the logic of the Comparator Model (Sokolov, 1963) and infants' ability to detect categorical congruency between different modalities, we reasoned that if infants have a positive representation of familiar language speakers, they should habituate faster to sequences in which speakers of a familiar language are paired with positively evaluated objects or actions than to sequences in which speakers of an unfamiliar language are paired with positive things or in which speakers of a familiar language are paired with negative stimuli. Similarly, if infants have a negative evaluation of unfamiliar language speakers, then they should habituate faster to sequences in which speakers of an unfamiliar language are paired with negatively evaluated objects or actions than to sequences in which speakers of a familiar language are paired with negative things or in which speakers of an unfamiliar language are paired with positive stimuli. We explore this question across six experiments.

2 | EXPERIMENT 1

Experiment 1 examined whether infants more readily associate familiar (English) versus unfamiliar language speakers (French) with prosocial (giving) or antisocial (taking) behaviors. Following Hamlin and colleagues, who showed that infants prefer prosocial agents who return dropped balls over antisocial agents who take them away (Hamlin & Wynn, 2011), we showed infants a puppet performing the same prosocial giving or antisocial taking event repeatedly (between-subjects). Critically, we manipulated whether the actor spoke English or French before performing the giving or taking action. We reasoned that if infants have a more positive evaluation of familiar language speakers than unfamiliar language speakers, then it should take fewer trials to reach the pre-set habituation criterion when English speakers behave prosocially compared to when French speakers behave prosocially. In addition, if infants evaluate familiar language speakers positively in general, then infants should take more trials to reach habituation when English speakers behave prosocially versus antisocially. Further, if infants have a more negative evaluation of unfamiliar language speakers, then they should take fewer trials to habituate when French speakers behave antisocially, compared to when English speakers behave antisocially or French speakers behave prosocially.

2.1 | Method

2.1.1 | Participants

For all experiments, infants were recruited and tested within a local science museum in a sound-proof room dedicated to behavioral science research. A legal guardian provided consent for child participation. A sample size of 96 infants (24 in each condition) that reach habituation was determined a priori. Typical studies of infant social cognition include 16 infants per cell, but since our age range is slightly larger we decided to increase our sample size in order to examine any potential effects of age (similar to Pun, Birch, & Baron, 2016, and Thomsen, Frankenhuis, Ingold-Smith, & Carey, 2011). For this reason, we maintain a sample size of 24 infants per cell for the subsequent studies. In all experiments, infants in the English conditions were exposed to English at least 80% of the time. None of the infants who participated in the French conditions were exposed to French. All participants were full term and had no known health problems.

Data from 96 infants (45 females; mean age = 8 mo 19 d, range = 6 mo–12 mo) were analyzed. Thirty additional participants were excluded because of fussiness (n = 14), caregiver interference (n = 2), experimental error (n = 1), or did not watch the critical moment in which the puppet performed a critical event: giving or taking the ball (n = 13). An additional six infants reached the full 30 trials without habituating. This rate of exclusion is considered typical given the venue (a local community science centre) in which infants were recruited and tested (e.g., Pun et al., 2016; Thomsen et al., 2011).

2.1.2 | Stimuli

Puppet shows were pre-recorded on a camcorder and subsequently converted into video files. Audio recordings in English and French were performed by native speakers of each language. Infants watched videos in which two identical male puppets stood on a black stage; one wore a blue and yellow shirt, the other wore a red and white shirt. At the start of each event, the puppet on the infants' left hand side (the Speaker) spoke in either English or French saying "Hi, look at me. Watch what I'm going to do. Are you ready?" The Speaker then paused, and the puppet on the right (the Protagonist, who never spoke) picked up and played with a ball, bouncing it and catching it repeatedly. After the third bounce-catch, the Protagonist dropped the ball and it rolled toward the Speaker; the Protagonist opened his arms as though requesting the ball to be returned. During prosocial events, the Speaker rolled the ball back to the Protagonist and then ran offstage. During antisocial events, the speaker ran offstage with the ball, stealing it away. Events lasted ~21 seconds for the English/French Prosocial sequences, and ~19 seconds for the English/French Antisocial sequences (see Hamlin & Wynn, 2011).

2.1.3 | Procedure

Infants were randomly assigned to one of four conditions: English Prosocial, English Antisocial, French Prosocial, and French Antisocial, resulting from the crossing of the factors Language group (Familiar, Unfamiliar), and Event valence (Positive, Negative).

Infants were positioned on the lap of their caregiver for the entire study, approximately 140 cm from the center of a 60″ LCD television screen. To ensure that caregivers' reactions to the stimuli would not influence infants' behavior, caregivers either kept their eyes closed or wore a pair of blackout glasses during the study; they were asked to remain silent and to not otherwise direct their child's attention. Throughout the study, an experimenter coded whether infants' attention was directed toward or away from the display, from behind a black curtain adjacent to the infant and caregiver using the program jHab (Casstevens, 2007). The protocol for infants and parents described above was identical for all subsequent experiments.

After the Speaker ran offstage at the end of each event, the Protagonist turned back towards the front and the animation froze; infants' attention was recorded to the paused video until the infant looked away for 2 cumulative seconds or 30 seconds elapsed, as measured by the experimenter using the program jHab (Casstevens, 2007). Infants then viewed the same event for subsequent trials until they reached habituation or until 30 trials passed. The pre-set habituation criterion was reached when the infants' mean looking time to the last three trials was equal to or less than half of the average mean looking time for the first three trials, which is typical for habituation studies. Therefore, the rate of habituation (our dependent measure) was calculated as the number of trials it took each infant to reach the habituation criterion.

2.1.4 | Reliability coding

Across all experiments, a secondary coder separately analyzed a subset of videos from each condition (at least 40% of the videos for every condition). Secondary coders were naïve to the hypotheses and kept blind to condition. To keep secondary coders blind to condition, we removed all audio (i.e., language audio) from the stimuli. The two coders reached agreement on the rate of habituation for 95%–98% of the participants' videos that were separately analyzed depending on the condition within each experiment. Online coders' rate of habituation was utilized for this and all reported experiments.

2.2 | Results and discussion

Infants' rate of habituation to these sequences was analyzed with a 2 (Language group: Familiar, Unfamiliar) × 2 (Event Valence: Positive, Negative) ANOVA, with the number of trials each infant took to reach the habituation criterion entered as the dependent variable. As predicted, the interaction between language group and valence was statistically significant, ($F_{1, 92}$ = 7.76, p = .007, η_p^2 = .078). Importantly, our results remained the same when age was added as a covariate (p < .05). Although there was a main effect of language group ($F_{1,92}$ = 4.41, p = .039, η_p^2 = .046), there was no main effect of event valence (p = .83).

Post-hoc comparisons between familiar and unfamiliar language groups revealed that infants were faster to habituate to English speakers behaving prosocially (Mean # trials to Hab =7.04) compared to French speakers behaving prosocially (Mean # trials to Hab = 9.46), t(46) = −3.34, p = .002, d = 0.96, suggesting that infants more strongly associate speakers of a familiar language with prosocial actions than they associate speakers of an unfamiliar language with prosocial actions. In addition, infants habituated more quickly to English speakers behaving prosocially (Mean # trials to Hab = 7.04), than to English speakers behaving antisocially (Mean # trials to Hab = 8.50), t(46) = −2.67, p = .01, d = 0.79, suggesting that infants associate speakers of a familiar language more strongly with prosocial actions than with antisocial actions.

In contrast to the comparisons above, infants habituated to English speakers behaving antisocially (Mean # trials to Hab = 8.50) and French speakers behaving antisocially (Mean # trials to Hab = 8.17) at the same rate, t(46) = 0.52, p = .61, d = 0.15. Similarly, there was no significant difference in the rate of habituation between French speakers performing antisocial (Mean # trials to Hab = 8.17) versus prosocial behaviors (Mean # trials to Hab = 9.46), t(46) = 1.62, p = .11, d = 0.46.

In Experiment 1, infants appeared to view the same prosocial and antisocial behaviors differently depending on whether they were performed by an individual who spoke a familiar versus an unfamiliar language. Specifically, these results suggest that by 12 months of age, infants associate speakers of a familiar language with prosocial acts, but do not yet associate speakers of unfamiliar languages with antisocial acts (see Figure 1).

3 | EXPERIMENT 2

In Experiment 1, both speaking (familiar/ unfamiliar language) and action valence (prosocial/antisocial) were performed by the same individual within the same trial. Therefore, infants' tendency to habituate faster to English speakers behaving prosocially may reflect either or both of two possibilities. First, consistent with our interpretation of the data, infants' tendency to habituate in fewer trials when an English speaker behaved prosocially may have resulted from two relatively independent evaluations: a positive evaluation of familiar language speakers and a positive evaluation of prosocial behaviors. Because these evaluations matched, infants processed these stimuli more quickly. Alternatively, infants may have habituated in fewer trials due to other more specific assumptions; for example, that familiar language speakers are expected to behave prosocially, and may be more likely to behave prosocially than are unfamiliar language speakers. Although we find each of these possibilities intriguing, our goal in the current research was to investigate evidence for the former; that is, whether infants generate independent positive (or negative) evaluations of familiar (or unfamiliar) language speakers. Thus, it is evidence for this possibility that we pursue in our subsequent studies.

In Experiment 2, infants were habituated to stimuli including familiar (or unfamiliar) language speakers in addition to positive or negative entities; however, rather than being presented within the same events and by the same actors, language and valenced stimuli

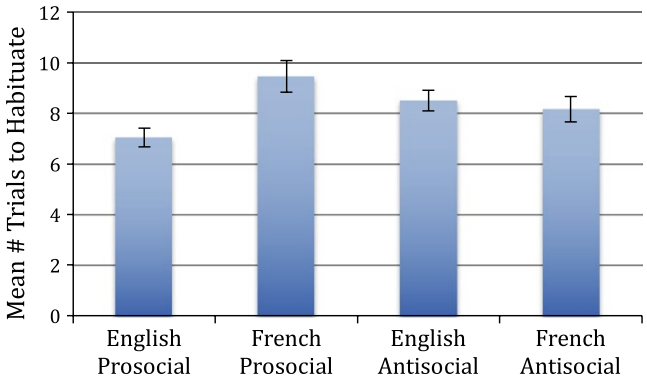

FIGURE 1 Mean number of trials to habituate observed for English Prosocial, French Prosocial, English Antisocial and French Antisocial conditions (Experiment 1). Error bars denote *SE* of the mean

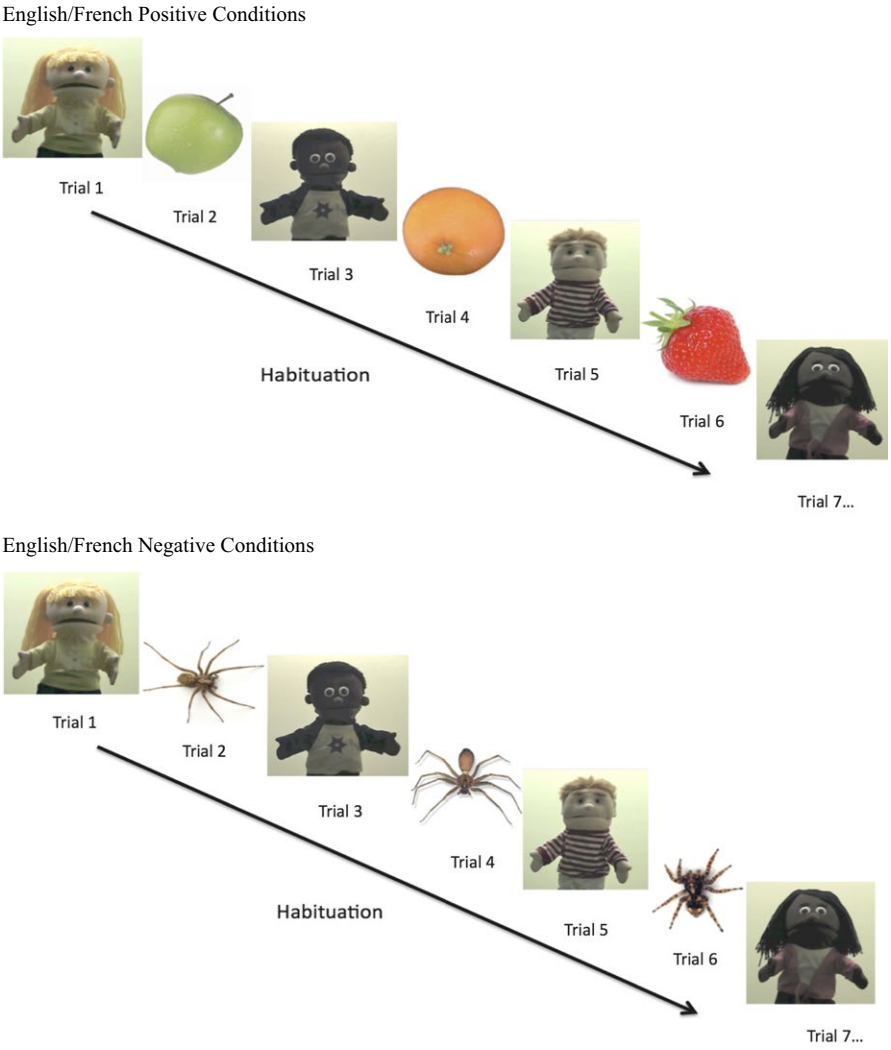

FIGURE 2 Examples of positive (fruit) and negative (spiders) stimuli interposed with language speakers (Experiment 2)

were presented separately, in alternating pairs of trials. We reasoned that if infants generate independent valenced evaluations of familiar/unfamiliar speakers, we should continue to observe effects like those in Experiment 1, wherein infants reach the habituation criterion at different rates to evaluatively congruent versus incongruent pairings. In contrast, if results from Experiment 1 reflect a more specific sense that familiar speakers will behave prosocially, we should not observe differences in rate of habituation in subsequent experiments.

3.1 | Method

3.1.1 | Participants

A sample size of 96 infants (24 in each condition) that reached habituation was determined a priori. Data from 96 infants (48 females; mean age = 12 mo 12d, range = 8 mo 3d–16 mo 29d) were analyzed. Forty-three additional participants were excluded because of fussiness (n = 31), caregiver interference (n = 11) or experimental error (n = 1). An additional 33 participants reached the full 30 trials without habituating.

3.1.2 | Stimuli

Videos of puppets speaking either English or French alternated with the images of fruits or spiders (see Figure 2). Audio recordings in English and French were performed by native speakers of each language. Our selection of evaluatively positive and negative stimuli was based on previous research with infants and toddlers. For example, young children have been shown to have positive reactions to sweet foods such as fruits (Drewnowski, Mennella, Johnson, & Bellisle, 2012) and across a variety of tasks reveal selective attention to food and information about food (Liberman, Woodward, Sullivan, & Kinzler, 2016; Lumeng, Cardinal, Jankowski, Kaciroti, & Gelman, 2008; Shutts, Kinzler, McKee, & Spelke, 2009; Wertz & Wynn, 2014). This suggests that images of fruit may constitute a category that infants evaluate positively. In contrast, young infants, children and adults easily recognize and fear evolutionarily threatening stimuli such as snakes and spiders (LoBue, 2010; LoBue, Rakison, & DeLoache, 2010; Öhman & Mineka, 2001; Rakison & Derringer 2008). Specifically, infants as young as 7 months of age have been shown to associate fearful voices with threatening animals such as snakes, and infants as young as 5 months of age appear to have an innate template recognition

for spiders (Cook & Mineka, 1989; LoBue, 2010; LoBue et al., 2010; Öhman & Mineka, 2001; Rakison & Derringer, 2008). Therefore, we chose to use images of spiders as negative stimuli.

3.1.3 | Procedure

Each infant was randomly assigned to one of four conditions: English Positive, French Positive, English Negative, or French Negative, resulting from the crossing of the factors Language group (Familiar, Unfamiliar) and Object valence (Positive, Negative). The testing set-up was identical to Experiment 1. In this experiment, infants first viewed a video of a single puppet (approximately 38 cm high by 25 cm wide) speaking in either English or French for 10 seconds. The sentence spoken was neutral in content. Puppets said, "Hi Baby, today I went to the zoo and saw many different animals. There were lions, monkeys, elephants and bears. It was a really big zoo", in either English or French. After the puppet had finished speaking, the animation froze with the puppet remaining on the screen until the infant looked away for 2 cumulative seconds or 45 seconds elapsed from the final word spoken, as measured by the experimenter using the program jHab (Casstevens, 2007). On alternating trials, infants viewed static images of individual fruits or individual spiders of similar size to the puppets; attention coding began as soon as the fruit/spider appeared. This alternating sequence of trials (puppet video/image of fruit or spider) continued until the infant reached a pre-set habituation criterion or until 30 trials passed. Since the stimuli presented in this experiment consisted of a combination of animated stimuli and static stimuli, we reasoned that looking to individual trials might vary considerably. Therefore, the pre-set habituation criterion was set so that each trial type contributed equally to the pre-set habituation criterion. We set the pre-set criterion to the point when infants' mean looking time to the last four trials was equal to or less than half of the average mean looking time for the first four trials, so that each infant viewed an equal number of video and picture stimuli in the trials for which habituation was determined. As in our previous experiment, rate of habituation (our dependent measure) was calculated as the number of trials it took each infant to reach the habituation criterion.

3.2 | Results and discussion

Infants' rate of habituation to these sequences was analyzed with a 2 (Language group: Familiar, Unfamiliar) × 2 (Object Valence: Positive, Negative) ANOVA, with the number of trials to habituate entered as the dependent variable. As predicted, the interaction between language group and object valence was statistically significant, $F_{(1,92)} = 8.11$, $p = .005$, $\eta_p^2 = .081$. Our results were nearly identical when age was included as a covariate ($F_{(1,92)} = 8.02$, $p = .006$, $\eta_p^2 = .081$). Although we observed a main effect of language group $F_{(1,92)} = 15.42$, $p < .001$, $\eta_p^2 = .14$ (see below), we did not observe a main effect of object valence ($p = .99$).

Conceptually similar to Experiment 1, post-hoc tests revealed that infants were faster to habituate to English speakers paired with positive stimuli (Mean # trials to Hab = 12.08) than French speakers paired with positive stimuli (Mean # trials to Hab = 19.67), $t(46) = -5.23$, $p < .001$, $d = 1.51$, suggesting that infants have established a greater positive association with English speakers than with French speakers. Infants were also significantly faster to habituate to English speakers paired with positive stimuli (fruits; Mean # trials to Hab = 12.08), compared with negative stimuli (spiders; Mean # trials to Hab = 15.25), $t(46) = -2.25$, $p = .03$, $d = 0.65$. Importantly, this result demonstrates that infants are not habituating more quickly to the familiar language group in general, but are responding to the interaction between language and valence. Together, these results conceptually replicate those reported in Experiment 1 as infants associate positivity more readily with English speakers than French speakers.

To examine whether infants negatively evaluate the unfamiliar language group, we conducted post-hoc comparisons examining whether infants associate foreign language speakers more strongly with negativity (relative to positivity). As with Experiment 1, infants were similarly quick to habituate to French speakers paired with negative stimuli (Mean # trials to Hab = 16.46) and to English speakers paired with negative stimuli (Mean # trials to Hab = 15.25), $t(46) = -0.71$, $p = .48$, $d = 0.21$, suggestive that they do not associate negativity more readily with an unfamiliar versus a familiar language group. Finally, infants did not habituate significantly faster to French speakers paired with negative stimuli (Mean # trials to Hab = 16.46) compared with French speakers paired with positive stimuli (Mean # trials to Hab = 19.67), $t(46) = 1.85$, $p = .07$, $d = 0.53$, although this effect was marginal. Taken together, our data suggest that whereas infants positively evaluate speakers of a familiar language, they are less likely to hold negative evaluations of speakers of an unfamiliar language (see Figure 3). That said, the marginal effect observed here suggests that infants may mildly associate negativity with French speakers; we will revisit this issue in the General Discussion.

In general, infants looked longer on average to French speaking puppets (M_{French} = 17.33 seconds) compared to English speaking puppets ($M_{English}$ = 14.50 seconds), $t(94) = -2.43$, $p = .02$, $d = 0.50$. However, average looking to language speakers could not explain our differential pattern of results, as infants were faster to habituate to English paired with positive stimuli compared with negative stimuli and average looking to a stimulus type on its own doesn't directly speak to differences in rate of habituation. There were no differences in looking time at images of fruits or spiders (M_{Fr} = 5.23 seconds, M_{Sp} = 5.76 second), $t(94) = -1.12$, $p = .26$, $d = 0.25$, suggestive that inherent characteristics of each stimulus type (e.g., visual complexity) could not explain our pattern of results.

4 | EXPERIMENT 3

Experiment 3 examined whether the absence of a negative evaluation of French speakers in Experiment 2 was due to a methodological limitation (e.g., our habituation procedure is unable to adequately capture negative evaluations). More specifically, if the spiders displayed in Experiment 2 were not perceived as negative, we would not know from our data whether infants of this age evaluate unfamiliar language groups negatively. To address this issue, we replaced the spider stimuli from Experiment 2 with images of broken familiar objects (e.g.,

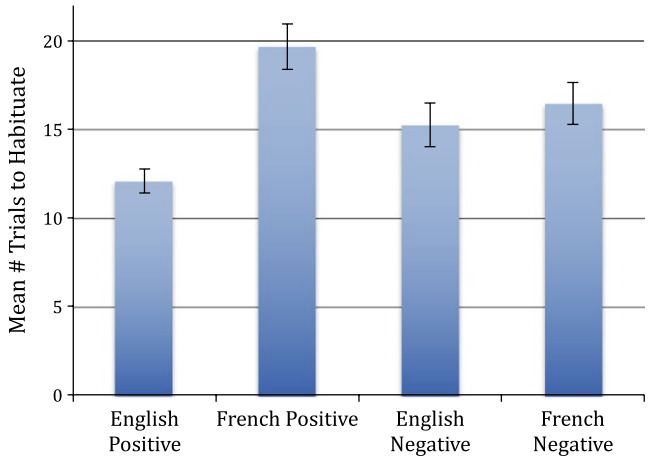

FIGURE 3 Mean number of trials to habituate observed for English Positive, French Positive, English Negative and French Negative conditions (Experiment 2). Error bars denote *SE* of the mean

broken dishes and toys), because past research suggests that young children perceive broken familiar objects as evaluatively negative (Kagan, 1981; Knox, Lagattuta, & Sayfan, 2013; Kochanska, Casey & Fukumoto, 1995). If infants possess negative evaluations of unfamiliar language speakers, then they should habituate more quickly to a sequence of trials in which broken familiar objects are paired with French speakers, compared to English speakers.

4.1 | Method

4.1.1 | Participants

A sample size of 48 infants (24 in each condition) that reach habituation was determined a priori. Data from 48 infants (24 females; mean age = 12 mo 18d, range = 7 mo 28d–16 mo 29d) were analyzed. Seven additional participants were excluded because of fussiness (n = 6) and caregiver interference (n = 1). An additional eight participants reached the full 30 trials without habituating.

4.1.2 | Stimuli

The same English and French speaking puppets from Experiment 2 were alternated with a new class of negative stimuli: broken familiar objects (see Figure 4a).

4.1.3 | Procedure

Participants were randomly assigned to one of two conditions: English Broken Objects or French Broken Objects. All procedures were identical to Experiment 2.

4.2 | Results and discussion

As with Experiment 2, infants were similarly quick to habituate to French speakers paired with broken objects (Mean # trials to Hab = 16.88) and to English speakers paired with broken objects (Mean # trials to Hab = 17.29), $t(46) = 0.23$, p =. 82, d = 0.07, suggestive that infants do not associate negativity more readily with an unfamiliar versus a familiar language group. Although this is a null result, these findings are consistent with those found in Experiment 2 (English/French spider conditions) and provide a conceptual replication of an absence of a negative evaluation of language groups.

Post-hoc analyses of the average looking time towards English and French speakers revealed no significant differences (M_{En} = 15.60 seconds, and M_{Fr} = 16.42 seconds), $t(46) = -0.53$, p = .60, d = 0.16. Therefore, it is unlikely that unfamiliar stimuli (French speakers) lead to longer looking time in general. Overall, these findings suggest that it is unlikely that the absence of a negative evaluation of language groups observed in Experiment 2 is due to a methodological limitation in our capacity to measure negative associations.

5 | EXPERIMENT 4

Experiment 4 attempted to address an alternative explanation for the observed absence of a negative intergroup evaluation reported in the prior experiments. One possibility is that infants may not have perceived spiders (Experiment 2) or broken familiar objects (Experiment 3) as evaluatively negative. Therefore, we chose to compare rates of habituation to a sequence of trials in which images of broken objects alternated with images of spiders compared with a sequence of trials in which images of broken objects alternated with images of fruit. We reasoned that if infants find spiders and broken objects to be evaluatively congruent (i.e., if both are seen as negative), they should reach a pre-set habituation criterion at a faster rate when a sequence of spider and broken object images alternate, compared to when a sequence of broken object and fruit images alternate.

To further address the possibility that our habituation procedure can reliably measure evaluative congruency between different classes of stimuli, we also measured infants' rate of habituation to a sequence of trials in which images of fruit alternated with images of smiling faces. Indeed, previous research has demonstrated that infants as young as 5 months have a robust preference for smiling faces (Farroni, Menon, Rigato, & Johnson, 2007; LaBarbera, Izard, Vietze, & Parisi, 1976; Ludemann & Nelson; 1988). Thus, we reasoned that if infants perceive two classes of stimuli as evaluatively congruent (i.e., if spiders and broken objects are both viewed as evaluatively negative, and fruit and smiling faces are both viewed as evaluatively positive), then infants should take fewer trials to habituate to congruent pairings, compared to the incongruent pairing (broken objects paired with fruit).

5.1 | Method

5.1.1 | Participants

A sample size of 72 infants (24 in each condition) that reach habituation was determined a priori. Data from 72 infants (37 females; mean age = 12 mo 8 d, range = 8 mo 2d–16 mo 25d) were analyzed.

FIGURE 4 Examples of (A) familiar broken objects, (B) spiders and (C) fruit

Four additional participants were excluded because of fussiness. An additional eight infants reached the full 30 trials without habituating.

5.1.2 | Stimuli

Images of broken familiar objects, spiders, fruit (see Figure 4) and smiling faces (see Figure 5). There were three images for each object category, each displayed individually on the screen.

5.1.3 | Procedure

Infants were assigned to one of three conditions: Negative-Negative, Positive-Positive, or Negative-Positive. In the Negative-Negative condition, infants viewed images of broken objects alternating with images of spiders; in the Positive-Positive condition, infants viewed images of fruit alternating with images of smiling faces. In the Negative-Positive condition, infants viewed images of broken objects alternating with images of fruits. Infants were presented with one static image per trial. The testing set-up was identical to Experiment 1.

For each trial, infants viewed static images of individual fruits, smiling faces, spiders or broken familiar objects; all objects were approximately 38 cm high by 25 cm wide. Coding began as soon as the stimuli appeared, and continued until infants looked away for 2 consecutive seconds or 45 seconds elapsed. Trials continued until the infant reached a pre-set habituation criterion, or s/he had seen 30 total trials (15 of each type of object). As with Experiment 1, and past habituation studies using a single stimulus modality type, the pre-set habituation criterion was reached when the infants' mean looking time to the last three trials was equal to or less than half of the average mean looking time for the first three trials.

5.2 | Results and discussion

Infants were faster to habituate in the Negative-Negative condition (broken objects paired with spiders) (Mean # trials to Hab = 10.00) compared to the Negative-Positive condition (broken objects paired with fruit) (Mean # trials to Hab = 13.71), $t(46) = 2.49$, $p = .02$, $d = 0.74$. In addition, infants were also faster to habituate in the Positive-Positive condition (fruit paired with smiling faces) (Mean # trials to Hab = 8.50) compared to the Negative-Positive condition (broken objects paired with fruit) (Mean # trials to Hab = 13.71), $t(46) = 4.081$, $p = .00$, $d = 1.18$. However, infants habituated at a similar rate in the Negative-Negative condition and Positive-Positive condition, $t(46) = 1.29$, $p = .20$, $d = 0.38$.

FIGURE 5 Examples of smiling faces

These results suggest that infants view broken objects paired with spiders, and fruit paired with smiling faces, as evaluatively congruent, and broken objects paired with fruit as evaluatively incongruent. Thus, these data suggest that it is unlikely that the absence of a negative evaluation of unfamiliar language speakers reported in Experiments 1, 2 and 3 is due to a methodological limitation where our stimuli or procedure were unable to measure negative evaluations or detect evaluative congruency between different categories of stimuli.

6 | EXPERIMENT 5

It is possible that infants may have habituated faster in the English Positive condition in Experiment 2 because both classes of stimuli (e.g., English speakers and images of fruit) might be more familiar to infants relative to the other classes of stimuli (e.g., French speakers and images of spiders). Although infants did not look longer to spiders vs. fruits, they did look longer to French speakers compared to English speakers. In Experiment 5, we directly addressed the potential effect of stimulus familiarity on infants' rate of habituation in our method. Specifically, infants were habituated to English or French speakers (between-subjects) paired with images of either non-evaluative familiar stimuli (familiar vehicles) or non-evaluative novel stimuli (obscure mechanical parts), borrowed from past studies of word learning for familiar and unfamiliar objects with infants and toddlers (Halberda, 2006). If infants habituated faster in the English Positive conditions in Experiment 2 because English and fruit are more familiar than French and spiders, then infants should habituate more quickly to English paired with familiar objects compared to English paired with novel objects (or to French paired with familiar objects).

6.1 | Method

6.1.1 | Participants

A sample size of 96 infants (24 in each condition) that reach habituation was determined a priori. Data from 96 infants (48 females; mean age = 12 mo 13d, range = 7 mo 29d–16 mo 21d) were analyzed. Thirty-six additional participants were excluded because of fussiness (n = 27) or caregiver interference (n = 9). An additional 29 infants reached the full 30 trials without habituating.

6.1.2 | Stimuli

The same English and French speaking puppets from Experiment 2 were used. However, images of fruits and spiders from Experiments 2 and 3 were replaced with images of familiar and novel objects respectively (see Figure 6).

6.1.3 | Procedure

Participants were randomly assigned to one of four conditions, resulting from the crossing of the factors Language group (Familiar, Unfamiliar) and Object type (familiar, novel): English Familiar, French Familiar, English Novel and French Novel. All procedures were identical to Experiment 2.

6.2 | Results and discussion

A 2 (Language group: Familiar, Unfamiliar) × 2 (Object type: Familiar, Novel) ANOVA with the number of trials to habituate entered as the dependent variable revealed no main effect of language ($F_{(1,92)}$ = 0.15, p = .70, η_p^2 = .002), object type ($F_{(1,92)}$ = 1.65, p = .20, η_p^2 = .018), and no interaction between these two terms ($F_{(1,92)}$ = 0.93, p = .34, η_p^2 = .010). Since infants did not habituate significantly faster to English speakers paired with familiar objects, this suggests that infants are not simply habituating faster to familiar pairings in general, and thus familiarity alone is unlikely to account for the results reported in Experiment 2.

Post-hoc analyses of the average looking time towards English and French speakers revealed no significant differences (M_{En} = 15.90 seconds, and M_{Fr} = 17.11seconds), t(94) = −0.89, p = .38, d = 0.18. Similarly, there were no significant differences between infants' looking toward Novel or Familiar objects (M_{Nov} = 5.58 seconds, and M_{Fam} = 6.67 seconds), t(94) = 1.42, p = .16, d = 0.29. Therefore, it is unlikely that unfamiliar stimuli (French speakers or novel objects) lead to longer looking-time in general.

FIGURE 6 Examples of familiar vehicles (top row) and novel objects (bottom row)

7 | EXPERIMENT 6

Finally, Experiment 6 provided one additional test of the central finding reported in this manuscript and observed in Experiments 1 and 2 that infants hold a stronger positive evaluation of a familiar language group relative to an unfamiliar language group. Using the same basic methodology as Experiment 2, we examined rates of habituation to English and French speaking puppets paired with happy, smiling faces. Similar to our predictions from Experiments 1 and 2, we hypothesized that if infants indeed evaluate the familiar language group more positively than the unfamiliar language group, then they should habituate more quickly to English speakers paired with smiling faces compared to French speakers paired with smiling faces.

7.1 | Method

7.1.1 | Participants

A sample size of 48 infants (24 in each condition) that reach habituation was determined a priori. Data from 48 infants (24 females; mean age = 13 mo 8d, range = 7 mo 30d–16 mo 28d) were analyzed. Fifteen additional participants were excluded because of fussiness (n = 10), caregiver interference (n = 4) or experimental error (n = 1). An additional six participants reached the full 30 trials without habituating.

7.1.2 | Stimuli

The same English and French speaking puppets from Experiment 2 were alternated with smiling faces (see Figure 5), as previous research has demonstrated that infants as young as 5 months have a robust preference for smiling faces (Farroni et al., 2007; LaBarbera et al., 1976; Ludemann & Nelson, 1988). The colors of the smiling faces were chosen to be green, orange and red to maintain consistency with the color of the fruits used in Experiments 2 and 4 (green apple, orange and strawberry).

When the image of the face initially appeared on the screen, the corners of the mouth were animated to turn upwards into an intense smile, and the pupils moved slightly upwards to reveal a happy expression. This process ensured that infants focused on the expression itself and would appropriately perceive them as smiling and happy, as previous research has demonstrated that infants respond less well to the emotionality of static faces (Caron, Caron, & Myers, 1985).

7.1.3 | Procedure

Participants were randomly assigned to one of two conditions: English Happy or French Happy. All procedures were identical to Experiments 2, 3 and 5.

7.2 | Results and discussion

Once again we observed that infants were faster to habituate to English speakers paired with an evaluatively positive stimulus (smiling faces) (Mean # trials to Hab = 15.21) compared with French speakers paired with smiling faces (Mean # trials to Hab = 18.67), $t(46) = -2.46$, $p = .018$, $d = 0.71$. This did not reflect a tendency to look longer at English versus French speakers: as in Experiments 3 and 5, infants looked similarly to English speaking ($M_{English}$ = 14.58 seconds) and French speaking puppets (M_{French} = 15.04 seconds), $t(46) = -0.25$, $p = .80$, $d = 0.07$.

Conceptually replicating our results from Experiments 1 and 2, infants exhibited greater positivity towards the familiar language group (English) than the unfamiliar language group (French). Once again, no effects of age were observed.

Given that this pattern of results emerged consistently across Experiments 1, 2 and 6 using three different kinds of evaluatively positive stimuli (prosocial behavior, fruit, smiling faces), it is unlikely that infants are responding solely to the language being spoken. In addition, the only main effect of language was found in Experiment 2. Infants viewing the same English and French speaking puppets in Experiments 3, 5 and 6 did not look longer on average to either language group.

8 | GENERAL DISCUSSION

Although numerous studies using forced-choice paradigms indicate that infants have social group preferences across a variety of domains, it is often unclear whether an infant's choice to look at or interact with an individual is driven by positivity toward individuals from one group, negativity toward individuals from the other group, or both. In addition, it is not clear from previous research whether infants' differential attention to (or preferential engagement with) a particular stimulus necessarily indicates an *evaluative* preference. In other words, infants may simply look longer at one (type of) face (e.g., native language speaker) over another (e.g., foreign language speaker) because it represents what is more familiar in their social environment, without automatically attributing positivity or negativity toward either the individual or its group. By implementing a habituation procedure, we aimed to independently measure the strength of infants' positive or negative associations with a familiar or unfamiliar language group in our study. We demonstrate that within the first year of life, a positive evaluation of individuals from a familiar social group emerges independently and prior to negative evaluations of individuals from unfamiliar social groups. Therefore, while infants think that speakers of a familiar language (English) are *good* and *not bad*, and are *good* relative to speakers of a foreign language (French), they do not hold corresponding negative evaluations of speakers of an unfamiliar language.

These data have several implications for theories of intergroup bias. First, if intergroup bias begins as a positivity bias toward familiar social groups, then future research should address how these initial representations may lead to the development of negativity toward unfamiliar groups. Importantly, our initial findings demonstrate that having a positive evaluation of a familiar social group does not automatically lead to a negative evaluation of unfamiliar social groups, nor to expectations that a speaker of an unfamiliar language is any more likely to engage in antisocial behavior.

However, it is worth noting that we observed two marginal findings in Experiments 1 and 2, as infants demonstrated a trend to habituate faster to French paired with negative stimuli compared to positive stimuli. Although these results were not significant, we were adequately powered to detect a negativity bias. Taken together, these results suggest that having a positive evaluation of familiar groups may be part of our core cognition of social groups, whereas the development of negative evaluations towards unfamiliar social groups may not emerge as readily. In addition, it is possible that the culture in which children grow up influences the developmental trajectory of the acquisition of negative intergroup evaluations. Specifically, given that infants have the capacity to develop negative evaluations towards individuals (Hamlin, Wynn, & Bloom, 2010), it is possible that negative evaluations towards a social group may emerge earlier in a cultural context in which strong negative attitudes towards a certain group are particularly salient. One way in which researchers can address this possibility is to study infants' social group evaluations in an environment where there is a high level of intergroup conflict (and presumably greater prevailing negativity towards social outgroups). For example, researchers could examine whether negative evaluations toward ethnic categories in regions with heightened ethnic conflicts (e.g., Middle East between Israel and Palestine) might emerge in infancy.

Interestingly, an absence of negative attitudes towards a social group in infancy is consistent with findings with older children, which demonstrate that implicit and explicit positive attitudes toward ingroup members emerge prior to negative attitudes toward outgroup members (Aboud, 2003; Brewer, 1999; Buttelmann & Böhm, 2014). Coupled with our findings, it is possible that a divergence between positive and negative evaluations of social groups may be independently acquired, and represent two distinct developmental trajectories.

Lastly, future research should explore whether the absence of negativity toward unfamiliar groups is specific to language groups, or whether it is a general feature of infants' intergroup attitudes. It is unlikely that this absence of a negativity bias is due to a cognitive limitation of infants' ability to form negative evaluations of individuals or of categories more generally. Indeed, across numerous paradigms, Hamlin and colleagues have demonstrated that 3- and 6-month-old infants are capable of evaluating antisocial individuals negatively (Hamlin, Wynn, & Bloom, 2007; Hamlin et al., 2010). In addition, data from Experiment 3 suggest that infants are capable of forming negative evaluations of two distinct categories (broken objects and spiders). And yet, data from Experiment 1 show that when using the same events as Hamlin and colleagues in the context of social groups rather than individuals, infants do not demonstrate a negative evaluation of one group relative to the other. Therefore, even though infants can form negative evaluations of individuals and object categories, it may not be the case that they form negative evaluations of social groups, at least in terms of language groups. Although we focused on the foundation of infants' evaluations of language groups, research shows that infants within the first year of life reason about a variety of other dimensions of social classification including those based on race, gender and even attractiveness (Bar-Haim et al., 2006; Kelly et al., 2005; Kinzler et al., 2007; Kinzler & Spelke, 2011; Quinn et al., 2002; Ramsey, Langlois, Hoss, Rubenstein, & Griffin, 2004). Thus, future studies could examine whether infants' social evaluations of familiar and unfamiliar groups in these other domains exhibit a similar pattern of data. Such research will provide greater insight into the nature and origins of intergroup bias.

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Graphical Abstract

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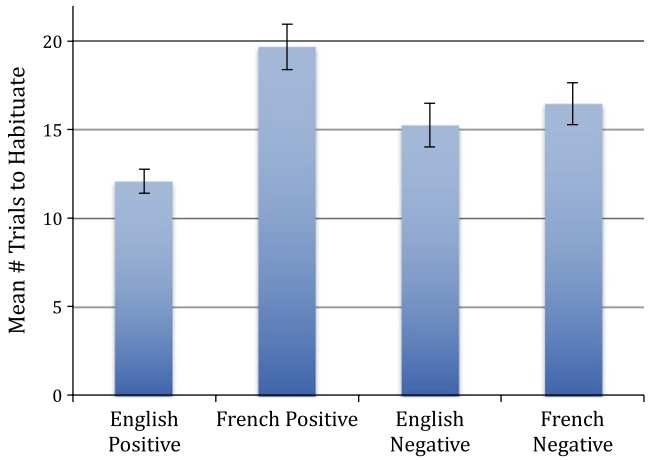

Previous research on infants' social group evaluations have typically employed procedures that prevent the independent assessment of positive and negative evaluations. Across six experiments we implemented a habituation procedure designed to independently measure infants' positive and negative evaluations of speakers of familiar and unfamiliar languages. We report that by 1 year of age, infants positively evaluate individuals who speak a familiar language, but do not negatively evaluate individuals who speak an unfamiliar language. These results suggest that a positive evaluation of individuals from a familiar social group emerges independently and prior to negative evaluations of individuals from unfamiliar social groups.