The native language of social cognition

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What leads humans to divide the social world into groups, preferring their own group and disfavoring others? Experiments with infants and young children suggest these tendencies are based on predispositions that emerge early in life and depend, in part, on natural language. Young infants prefer to look at a person who previously spoke their native language. Older infants preferentially accept toys from native-language speakers, and preschool children preferentially select native-language speakers as friends. Variations in accent are sufficient to evoke these social preferences, which are observed in infants before they produce or comprehend speech and are exhibited by children even when they comprehend the foreign-accented speech. Early-developing preferences for native-language speakers may serve as a foundation for later-developing preferences and conflicts among social groups.

cognitive development

> The Gileadites captured the fords of the Jordan leading to Ephraim, and whenever a survivour of Ephraim said, "Let me go over," the men of Gilead asked him, "Are you an Ephraimite?" If he replied, "No," they said, "All right, say 'Shibboleth'." If he said, "Sibboleth," because he could not pronounce the word correctly, they seized him and killed him at the fords of the Jordan. Forty-two thousand Ephraimites were killed at that time.
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> Judges 12:5–6.

The biblical story of Shibboleth speaks of the ancient massacre of those who could not correctly pronounce a phrase, thereby revealing their out-group status. Modern-day Shibboleth is ubiquitous: United States history alone abounds with examples of linguistic discrimination, from the severing of the tongues of slaves who spoke no English, to the forbidding of the public speaking of German during World War II and the execution of Russian speakers after the Alaskan purchase (1). Recent world history provides examples of linguicide paired with genocide of the Kurds in Turkey (2) and of imposed language policies initiating anti-Apartheid riots in South Africa (3). Favor for one's native language group pervades contemporary politics in more subtle ways as well, for example, in recent debates concerning bilingual education, the politics of sign languages in deaf education, or proposals to make English the national language of the United States. We present evidence that the connection between language and human social groups has roots in human infancy, where it guides early-developing social preferences and predisposes humans to interact with members of their own linguistic group.

Newborn infants are sensitive to human speech and prefer the sound of their mother's voice and their native language (4–8). Throughout the first year of life, an ability to distinguish contrasts between nonnative speech sounds diminishes, whereas sensitivity to native speech is maintained (9–11). Although infants' looking time preferences to familiar vs. novel displays may vary based on factors such as complexity and duration of exposure (12–15), often young infants demonstrate a preference for the visually familiar, such as for their mother's face, a familiar-race face, or a face of the primary caregiver's gender (16–18). Building on these findings, we asked whether infants and young children show visual and social preferences for speakers of their native language.

In the first experiment, 5- to 6-month-old infants from American English-speaking families ($n = 22$) viewed alternating sound films of two adult women who both spoke to them in American English, yet one film was played forward (natural speech), whereas the other was played in reverse (unnatural speech with a similar spectral and temporal structure). The order and lateral positions of the faces and the pairings of faces to language conditions were counterbalanced across infants to control for extraneous preferences for one face or side. After familiarization with each speaker, the two women were presented side by side, smiling but no longer speaking (Fig. 1*a*). Infants looked maximally and therefore equally at the two speakers during the speaking familiarization trials, ensuring equal exposure to the two faces before the test trial. During the silent-test trial, in contrast, infants looked reliably longer at the person who previously had spoken in natural English [mean of 61.03% looking at forward speaker, $t(21) = 2.99$, $P < 0.01$ compared with chance; 17 of 22 infants displayed a preference for the forward speaker; Fig. 2*a*]. Thus, infants showed signs of an early looking preference for people whose prior speech was natural rather than unnatural.

To investigate the specificity of this language-induced preference, a control experiment was conducted with the same forward- and reversed-speech sounds but with moving geometric forms instead of human faces. A separate group of 5- to 6-month-old infants ($n = 24$) viewed alternating films of two differently colored and shaped moving geometric forms, one paired with forward and the other with reversed speech. During this period of familiarization, looking times were equal and near ceiling, as in the first experiment. During the subsequent silent test, however, infants showed no preference for the form that had been paired with forward speech [50.95% mean looking at the object paired with forward speech, $t(23) = 0.33$, $P = 0.74$; 12 infants displayed a preference for each object; Fig. 2*b*]. Infants' looking preference for the visual display that accompanied forward speech was higher for speaking faces than for moving inanimate patterns [$F(1,44) = 4.75$, $P < 0.05$]. Thus, the presentation of natural language induced a visual preference for the speaker of that language but not for a cooccurring visual pattern.

Because reversed speech falls outside the domain of possible human languages, we next investigated whether infants would look preferentially at a person who spoke in their native language, relative to a person who spoke a language that was natural but foreign. A new group of 6-month-old infants from monolingual American English families ($n = 24$) viewed alternating films of two adult women speaking in American English vs. Spanish. The speakers were bilingual, and so the pairings of faces to languages and lateral positions again were counterbalanced. Although infants looked equally to the two speakers during the speaking familiarization trials, they looked reliably longer, in the subsequent silent test, at the person who previously spoke to them in English [mean of 61.25% looking to English speaker,

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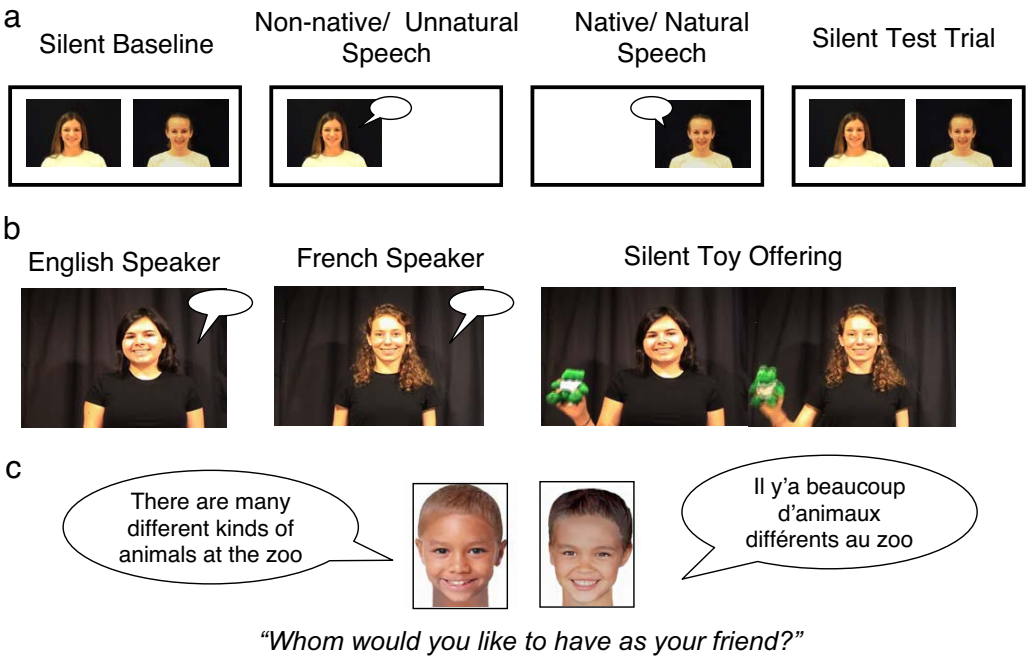

Fig. 1. Example displays for the social preference experiments. (*a*) Five- to 6-month-old infant looking time procedure. (*b*) Ten-month-old infant toy choice procedure. (*c*) Five-year-old child friendship choice procedure. In all experiments, the order and positions of native and nonnative speakers and the pairings of speech conditions with faces were counterbalanced.

$t(23) = 2.65$, $P < 0.01$ compared with chance; 19 of 24 infants displayed a preference for the English speaker; Fig. 2*c*]. Thus, infants prefer to look at a person who previously spoke in their native language to one who spoke in a foreign language.

Although looking-time measures allow tests of social sensitivity early in infancy, measures of social exchange may reveal children's social preferences more clearly. In the next experiment, we presented 10-month-old infants living either in monolingual English-speaking households in Boston ($n = 16$) or in monolingual French-speaking households in Paris ($n = 16$) with alternating films of one monolingual French- and one monolingual English-speaking adult (Fig. 1*b*). On each of four test trials, the adults first spoke in their

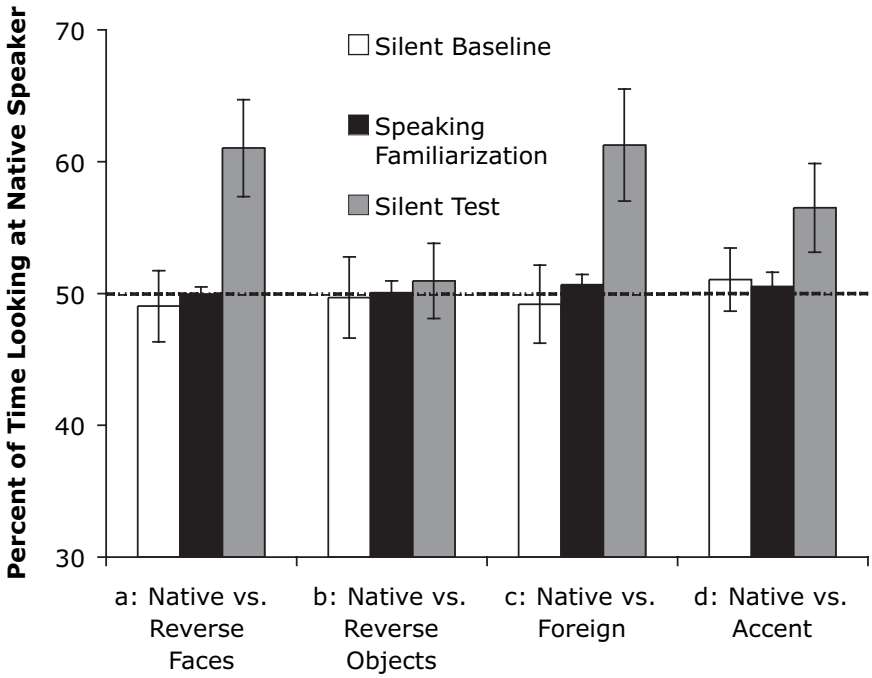

Fig. 2. Looking preferences by 5- to 6-month-old infants for adult speakers of their native language. Infants looked longer at silent human adults who previously spoke in the infants' native language played naturally rather than in reverse (*a*), in the infants' native language rather than a foreign language (*c*), or in the infants' native language with a native accent rather than a foreign accent (*d*). (*b*) Infants showed equal looking at silent moving geometric forms previously paired with the forward- vs. reverse-speech streams.

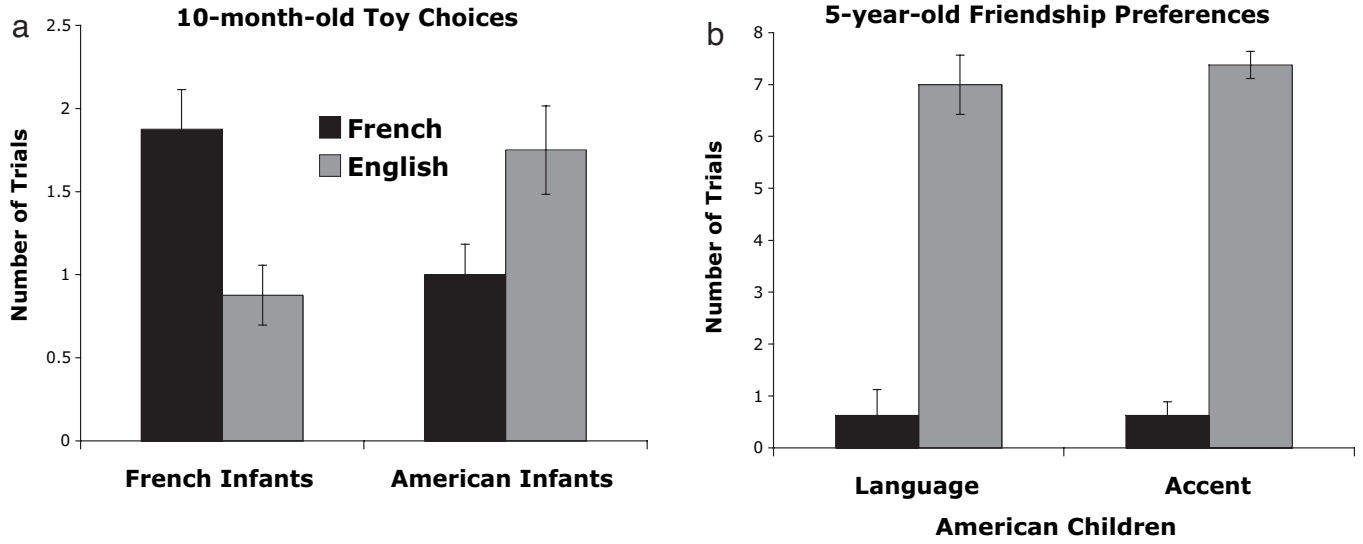

Fig. 3. Social preferences by 10-month-old infants and 5-year-old children for adult speakers of their native language. (*a*) French and American infants preferentially selected a toy offered by a person who previously spoke in their native language. (*b Left*) American children chose to be friends with a child who previously spoke English rather than French. (*b Right*) American children chose to be friends with a child who previously spoke English with a native accent rather than a French accent.

native language, in alternation, and then appeared side by side, smiling and silent, as each adult introduced and offered an identical toy, silently and in synchrony, to the infant. As the filmed offering ended, real versions of the toys appeared on a table within the infants' grasp, giving the illusion that the toys emerged from the screen, and infants' manual choices were measured. Infants in Paris reached more for the toy offered by the French speaker [$F(1, 15) = 12.00, P < 0.01$], whereas those in Boston reached more for the toy offered by the English speaker [$F(1, 15) = 5.87, P < 0.05$], a significant interaction [$F(1, 30) = 17.09, P < 0.001$; Fig. 3*a*]. At 10 months, infants preferentially engaged with a silent person who previously spoke in their native language, relative to a person who spoke in a different language, even though the two possible interactions were identical and nonlinguistic in nature.

In an additional experiment, we tested whether older children's explicit social preferences are influenced by a speaker's language. On each of eight trials, 5-year-old children in monolingual English families ($n = 8$) viewed photographs of two unfamiliar children while hearing each person speak in French or English (Fig. 1*c*). Both the faces and the lateral positions associated with each language were varied across trials and counterbalanced across children. After hearing both people speak, children were asked whom they would rather have as a friend. Children chose the child paired with English over the child paired with French speech [$t(7) = 6.78, P < 0.001$; Fig. 3*b Left*]. Thus, language influenced the explicit social preferences of these young children.

Together, these experiments provide evidence for an early-developing social preference for members of one's native language group compared with members of a foreign language group. One remaining question concerns the status of people who speak the child's native language but do so with a foreign accent. Are such people favored as native speakers or disfavored as foreign speakers, despite their use of the native language? We asked this question of both infants and children. Following the method of the previous preferential-looking experiments, 5- to 6-month-old infants from monolingual families in Paris and Boston ($n = 24$; 12 in each location) were presented, in alternation, with films of one speaker with a native accent and one speaker with a foreign accent whose speech was judged by adult native listeners to be comprehensible. The same two speakers were shown speaking French to the infants in Paris and English to the infants in Boston; because one was a native speaker of English and the other of French, the pairing of accents (native vs. foreign) and speakers was counterbalanced across the two infant samples. Although infants looked maximally and equally at the speakers during the speaking familiarization trials, they preferred the speaker with the native accent to the speaker with the foreign accent in the subsequent silent test [mean of 56.5% looking to native speaker, $t(23) = 1.94, P < 0.05$; 18 of 24 infants preferred the native speaker; Fig. 2*d*]. Finally, following the method of the previous friendship-choice experiment, a new group of 5-year-old children in Boston ($n = 8$) was presented with photographs of children's faces paired with voices in either American- or French-accented English. Children tended to choose the child with the American accent as a friend [$t(7) = 12.8, P < 0.001$], preferring that person as strongly as those who had viewed faces paired with different languages (Fig. 3*b Right*). This preference did not stem from a failure to comprehend the foreign-accented speech, because a separate group of 5-year-old children from the same population ($n = 8$) showed high comprehension of both the native- and the foreign-accented speech (100% comprehension for the native speech; 87% for the foreign speech; four of eight children responded 100% correctly for the foreign-accented speech).

Research on adults underscores the importance of accent as a social-category marker. Among speakers of the same language, accent may mark an individual's social class, ethnic group, and regional identity; adults tend to attribute more positive qualities to a person who speaks with a dominant or native accent to others whose speech is comprehensible but signals membership in a different social group (19). The present research suggests that a preference for speakers with a native accent begins to emerge in prelinguistic infants, and that it influences the social choices of young children who have little explicit understanding of the circumstances that would lead other people to speak comprehensibly but distinctively.

Although much remains to be learned about the origins and development of social categories and preferences, our findings support three suggestions concerning the nature and development of social group preferences. First, language provides a cue to social preferences, even in infants who have not begun to produce or understand speech. Second, the tendency to favor otherwise unfamiliar members of one's own social group begins to emerge early in human life and well before children begin to learn about the nature

and history of social-group conflicts. The passage from infants' social preferences to adults' social conflicts may be long and circuitous, but such a path may exist and may explain, in part, why conflicts among different language and social groups are pervasive and difficult to eradicate. Third, because human languages vary, and the native language must be learned, the tendency to make social distinctions is shaped by experience. Because language learning is especially adaptable early in development, social preferences also may be malleable at young ages. This early adaptability of preference formation for familiar characteristics of individuals may obtain for many potential indicators of social group membership. Attempts to reduce human social conflicts therefore may be enhanced by an understanding of their developmental origins.

Methods

Infant Looking-Time Experiments. Infants sat on a parent's lap and viewed two 16- × 25-cm images of adult female faces, separated by a 3-cm gap, on a 90-cm distant screen. In the main experiments, infants viewed alternating films of each person speaking (three films per speaker, 13–21 s in duration), preceded and followed by a silent trial with both speakers side by side and smiling. In the control experiment, the same speech was paired with equal-sized images of two distinctive geometric patterns that moved rigidly throughout the study. The order and lateral positions of the visual displays and the pairings of faces or objects to language conditions were counterbalanced across infants to control for extraneous preferences between the displays and sides. Looking to each of the speakers was coded off-line by an observer blind to the lateral position of the native speaker. Infants with a baseline preference (>80% looking at one speaker on the initial silent trial) were excluded and replaced. Looking times to the two speakers were compared during both the speaking trials and the silent test trial by Student's *t* tests (two-tailed in the initial experiment and one-tailed thereafter).

Participants in the forward/reverse experiment were full-term infants (12 female, mean age 5 months 25 days, range 5:15–6:1) from the greater Boston area. Participants in the control experiment were full-term infants (15 female; mean age 5:21; range 5:7–6:1) from the Boston area. Participants in the native/foreign language experiment were full-term infants (12 female, mean age 6:2, range 5:16–6:18) raised in monolingual American English-speaking households in the Boston area. Participants in the native accent/foreign accent experiment were full-term infants (14 female, mean age 5:22, range 5:15–6:0) either raised in monolingual French families and tested in Paris or raised in monolingual English-speaking families and tested in Cambridge, MA. Beyond the 94 participants in these experiments, 27 additional infants were tested but excluded because of fussiness (6), experimenter error or equipment failure (11), or a baseline preference (10).

Toy-Choice Experiment. Infants sat on a high chair or parent's lap and viewed life-sized images of two adult female speakers projected side by side on a 92 × 122-cm screen, behind a 50-cm-wide table. On four trials, each of the speakers appeared and talked to the infant (15 s), and then the two speakers appeared side by side and performed the same actions silently and in synchrony; they held up identical plush animals, smiled at the infant, smiled at the animal, and then smiled at the infant and lowered the animal as if offering it to the infant (19 s). Just as the objects disappeared off the screen, two real toy objects appeared from behind the table for the infant to grasp. The objects were attached by Velcro to poly(vinyl chloride) piping that rotated from behind the table and landed on the table equidistant from the infant and in front of the silent and motionless images of the two speakers. The ordering and lateral positions of the speakers were counterbalanced across infants, and the speakers reversed sides after the second trial. Infants' first reach during a 15-s period was recorded by an observer who was blind to the side of the native speaker on each trial. Data for any infant who reached on at least one of the four trials and watched the relevant offering event were included. Data were analyzed by repeated-measures ANOVAs comparing number of choices of the toy offered by the French vs. English speaker.

Participants were full-term infants (11 female, mean age 10:4, range 9:19–10:20) raised either in monolingual English-speaking households in the greater Boston area or in monolingual French-speaking households in Paris. Three infants were excluded for not making a choice of any toy (1) or not watching the relevant parts of the procedure (2).

Friendship-Choice Experiments. Children were shown pairs of static photographs of faces on a laptop computer. As an experimenter pointed to each face, she played a short sentence identified as the voice of that person. In the native- vs. foreign-language experiment, voices were of monolingual speakers of English and French. In the native- vs. foreign-accent experiment, the same monolingual speakers of English and French each spoke in English. After the voices were played, the faces remained visible, and children were asked, "Who would you like to have as your friend?" Children received eight trials with different pairs of faces (four male and four female pairs). The order and lateral positions of native and nonnative speakers were counterbalanced both across trials and across children, and the pairings of the language clips and faces were counterbalanced across children. All statistics are two-tailed compared with chance.

Eight children participated in the native- vs. foreign-speech experiment (mean age 66.5 months, range 62.5–68.5 months), and eight children participated in the native- vs. foreign-accent experiment (mean age 68 months, range 63–72 months). All were native speakers of English. A separate group of eight children of the same age were shown the displays for the accent experiment. After hearing two native- or two foreign-accented speech segments, they were asked two-choice questions about the content of the speech (e.g., "Was this child talking about the moon or the pool?").

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