UC Santa Barbara
UC Santa Barbara Previously Published Works

Title
Preverbal Infants Infer Third-Party Social Relationships Based on Language

Permalink
https://escholarship.org/uc/item/2dm2j26f

Journal
Cognitive Science, 41(S3)

ISSN
0364-0213

Authors
Liberman, Zoe
Woodward, Amanda L
Kinzler, Katherine D

Publication Date
2017-04-01

DOI
10.1111/cogs.12403

Peer reviewed

Preverbal infants infer third-party social relationships based on language

Zoe Liberman[a], **Amanda L. Woodward**[a], and **Katherine D. Kinzler**[a,b]

[a]University of Chicago Department of Psychology

[b]Cornell University Department of Psychology & Department of Human Development

Abstract

Language provides rich social information about its speakers. For instance, adults and children make inferences about a speaker's social identity, geographic origins, and group membership, based on her language and accent. Though infants prefer speakers of familiar languages (Kinzler, Dupoux, & Spelke, 2007), little is known about the developmental origins of humans' sensitivity to language as marker of social identity. We investigated whether 9-montholds use the language a person speaks as an indicator of that person's likely social relationships. Infants were familiarized with videos of two people who spoke the same or different languages, and then viewed test videos of the two individuals affiliating or disengaging. Results suggest that infants expected two people who spoke the same language to be more likely to affiliate than two people who spoke different languages. Thus, infants view language as a meaningful social marker and use language to make inferences about third-party social relationships.

Keywords

psychology; cognitive development; language; social cognition

---

Language is social. In addition to transmitting literal communication, a person's speech conveys nuanced information about her social identity, including evidence about her geographic origin, likely social relationships, and position in a broader social network (e.g., Labov, 2006). Because native accents are notoriously difficult to fake, language can serve as a particularly reliable signal of social group membership (e.g., Baker, 2001; Cohen, 2012; Henrich & Henrich, 2007). Here, we investigate the nature of humans' thinking about language as a signal of social affiliation by studying its developmental origins beginning in infancy.

For adults, language use marks social and cultural group (e.g., Babel & Munson, 2014; Casasanto, 2010; Giles & Billings, 2004; Glusek & Dovidio, 2010; Porter, Rhineschmidt-Same, & Richeson, in press). Children, too, make sophisticated inferences about others' identities based on their language and accent (e.g., Day, 1980; Hirschfield & Gelman, 1997; Kinzler & Dautel, 2012; Kinzler & DeJesus, 2013a; 2013b). These social inferences made

Corresponding Author: Zoe Liberman, 5848 S. University Ave, Chicago IL, 60637, zoeliberman@uchicago.edu, phone: 773-834-9791.

by children and adults must, at least in part, reflect cultural learning, including experiences hearing diverse languages and exposure to other people's beliefs about foreign-language or accented speakers. Indeed, many reported language-based social attitudes reflect knowledge of linguistic stereotypes (e.g., Day, 1980, Giles & Billings, 2004; Kinzler & DeJesus, 2013a). Stereotypes that link specific accents, dialects, or languages to features of individuals' personalities must be culturally transmitted, and are presumably unavailable to preverbal infants.

Nonetheless, certain types of inferences about the social significance of language could exist independently of knowledge of cultural stereotypes about groups of speakers. For example, upon meeting a speaker of a completely unfamiliar language, you might not be able to draw any specific inferences about that speaker. But, you might infer that she would continue to speak that language at a different time point, and if you then met a second speaker of that language, you might infer that the two individuals could be friends, or might share other common social attributes. Indeed, both adults and children utilize language and accent as robust indicators of an individual's social identity, and reliance on these cues can even surpass attention to visual cues such as ethnicity (Kinzler, Shutts, DeJesus, & Spelke, 2009; Kinzler & Spelke, 2011; Pietraszewski & Schwartz, 2014; Rakic, Steffens, & Mummendey, 2011). The propensity to infer that a person's language marks her social identity and potential social relationships could emerge early in human development, and set the stage for later reasoning.

Infants are sensitive to differences between languages (e.g., Hohle, Bijelijac-Babic, Herold, Weissenborn, & Nazzi, 2009), and they view language usage as a social behavior (e.g., Beier & Spelke, 2012; Martin, Onishi & Vouloumanos, 2012). Infants' own interactions with other individuals also depend on those individuals' language. Infants preferentially interact with and imitate native-language speakers (Buttelmann, Zmyj, Daum, & Carpenter, 2013; Kinzler, Dupoux & Spelke, 2007, 2012; Shutts et al., 2009). However, it is unknown whether infants' first-person interaction preferences simply reflect a preference for familiar speakers, or whether infants are likewise able to view language as a marker of an individuals' social identity. It thus remains an open question whether infants use language to make inferences about other people's patterns of affiliation, outside infants' own interactions with those individuals.

Here we investigate whether reasoning about affiliation intuitively recruits information about language. We test whether infants infer that people who speak the same language are more likely to affiliate than people who speak different languages. A growing body of evidence suggests that infants can reason about others' social relationships (e.g. Johnson et al., 2010; Kuhlmeir, Wynn, & Bloom, 2003; Liberman, Kinzler & Woodward, 2014; Mascaro & Csibra, 2012; 2014; Powell & Spelke, 2013). If spoken language serves as a reliable marker of social identity, then reasoning about language as marking social relationships may emerge prior to being exposed to extensive social experiences and language-based stereotypes. On the other hand, if linking language and affiliation depends on culturally transmitted experiences and beliefs, then infants should not infer that same language speakers are more likely to affiliate. Understanding infants' inferences about language has implications for a

theoretical understanding of the relationship between language and social categorization, and the developmental trajectory by which language signals social identification.

To test these ideas, we presented infants from monolingual English homes with videos featuring actors speaking English or Spanish. All conditions featured the same two bilingual individuals so that all infants saw the same two people varying only in terms of what languages they spoke. In Study 1, the actors were presented as two English speakers, or one English speaker and one Spanish speaker. Next infants saw videos where the speakers either affiliated with each other or socially disengaged. Because infants attend more to events that are inconsistent with their expectations, we used looking time to evaluate whether infants inferred information about the speakers' affiliation based on their languages. We predicted that infants would be more likely to expect the two English speakers to affiliate, and would be less likely to expect the English speaker and Spanish speaker to affiliate. In Study 2 we asked about infants' responses to two Spanish speakers to further understand their inferences about the link between language and affiliative behavior.

Study 1

Materials and Methods

Participants—Thirty-two 9-month-old infants (18 female; M_{age}= 9 months, 3 days; range= 8;15– 9;17) participated. All infants were from monolingual English-speaking homes according to parental report, and had no regular exposure to non-English languages. This sample size included the number of infants needed to fully counterbalance the design with 16 infants in each of two conditions. Two additional infants were tested but excluded due to distress (n=1) and having total looking times more than 2 standard deviations above the mean of their condition (n=1). Participants were randomly assigned to the English-English or the English-Spanish condition.

Procedure—During familiarization, infants watched a video repeat four times. Videos featured two actors seated together at a table. The actors faced forward and did not interact with each other: because the actors looked directly at the camera and spoke one at a time, they did not appear to be actively communicating. They instead each told a short vignette (approximately 12 seconds per actor) in either English or Spanish: one talked about the weather, and the other spoke about grocery shopping. All vignettes were spoken in infant directed speech and positive tones, meaning any differences between the conditions are likely not due to general positivity of the familiarization videos. The first speaker, her side of the table, and the language she spoke were counterbalanced across infants.

Infants were randomly assigned to one of two conditions (Fig. 1). Infants in the *English-Spanish* condition watched videos where one actor spoke English and the other actor spoke Spanish. Infants in the *English-English* condition watched videos where both actors spoke English. The actors were both bilingual speakers of Spanish and English, so infants in each condition viewed the same two actors.

Following familiarization, all infants viewed six alternating test trials in which the actors interacted positively by affiliating or interacted negatively by socially disengaging. Because

we wanted to show identical test trials across conditions, we ensured that featured vocalizations were expressive, but were not specific to English or Spanish. In affiliation trials, the actors started out facing the infant and then turned toward each other, paused briefly, and smiled and waved at one another while saying, " " (a long "a" sound) in a positive, high-pitched voice. In disengagement trials, the actors also started facing the infant and then turned toward each other, paused briefly, and finally turned away from each other, crossing their arms while saying "hmph" in a negative, low-pitched voice (Fig. 2). The test trials each had the same overall length of the interaction, and in both types of test trials the actors maintained the same distance from each other throughout such that they started the same distance apart and their bodies were as close together after interacting negatively as they were after interacting positively. Infants' looking times were recorded to the still images at the end of each trial. Timing for test trials started when the motion on the screen stopped and ended when the infant looked away for 2 consecutive seconds or when 30 seconds had elapsed, whichever happened first. Test trial order (whether infants saw affiliation or disengagement interactions first) was counterbalanced across infants in each condition.

Trained observers coded infants' attention online using jHab (Casstevens, 2007). Observers were unaware of participants' condition. For reliability, a second observer coded each infant from video. A correlation between the looking times measured by online observer and the video observer revealed high reliability (r>0.94). As a more conservative measure of agreement, we also measured whether the observers judged the same look away from the stimulus as ending the trial; observers agreed on the endpoint of 93% of test trials.

Results

We first evaluated attention during familiarization. To ask whether gender or speaker order influenced attention, we conducted preliminary analyses looking at each of these factors separately. A repeated measures analysis of variance (ANOVA) on attention (in seconds) to familiarization trials with gender as a between-subjects factor and trial number (first, second, third, and fourth) as a within-subjects factor revealed no significant main effect of gender or significant interaction between gender and trial number (ps>0.80). A similar analysis revealed no significant effects of speaker order or interaction between speaker order and trial numbers (ps>0.19). So, further analyses collapsed across these factors. To ask whether attention differed based on the languages the actors were speaking, a repeated measures ANOVA on attention (in seconds) to familiarization trials was conducted with condition (English-English, and English-Spanish) as a between subjects factor and trial number (first, second, third, and fourth) as a within subjects factor. There was a significant effect of trial number ($F_{3,90}$=4.09, p=.009, η_p^2=.120) reflecting decreased attention across familiarization trials, but no significant effect of condition ($F_{1,30}$=0.671, p=.534, η_p^2=.017). Thus, overall, infants were equally attentive during familiarization regardless of the languages the actors spoke, suggesting any differences between the two conditions were not based merely on differences in attention or interest to speakers of different languages.

Next, we evaluated infants' looking patterns during test trials. For test trials, we used repeated-measures ANOVAs with attention to the screen (in seconds) after the test movies had ended as the dependent variable. Preliminary repeated-measures ANOVAs asking about

potential effects of participant sex, speaker order, and test trial order found no significant main effects or interactions on attention to test trials based on gender ($ps>.37$), speaker order ($ps>.16$), or test-trial order ($ps>.38$), so subsequent analyses collapsed across these factors. A repeated measures ANOVA evaluating infants' looking times to the test trials with condition (English-English and English-Spanish) as a between-subjects factor and test pair (first, second, or third) and test type (affiliation vs. disengagement) as within-subjects factors, revealed a significant effect of test trial type ($F_{1,30}=9.00$, $p=.005$, $\eta_p^2=.231$) with infants looking longer at engagement events ($M=12.6$ seconds, $SD=7.7$ seconds) than disengagement events ($M=10.2$ seconds, $SD=3.7$ seconds), a significant effect of pair ($F_{2,60}=7.58$, $p=.001$, $\eta_p^2=.202$), revealing decreasing attention across test trials. Critically, as predicted, this analysis also revealed a significant condition by test trial type interaction ($F_{1,30}=27.51$, $p<.001$, $\eta_p^2=.478$). In order to understand this interaction, each condition was analyzed separately by performing the same repeated-measures ANOVA on testtrial looking times for each condition with pair and test trial type as within-subjects factors.

English-English Condition

Infants in the English-English condition exhibited reduced attention across test trials ($F_{2,30}=5.30$, $p=.011$, $\eta_p^2=.261$), and looked significantly longer at disengagement events ($M=10.4$ seconds, $SD=3.2$ seconds) than affiliation events ($M=8.5$ seconds, $SD=3.8$ seconds; $F_{1,15}=4.65$, $p=.048$, $\eta_p^2=.236$; Fig. 3). This pattern of results held across the sample: majority of infants in the English-English condition looked longer at disengagement events than affiliation events ($n=14$ of 16, binomial $p<.001$, two-tailed; Table 1).

English-Spanish Condition

Infants in the English-Spanish condition looked significantly longer at affiliation events ($M=17.0$ seconds, $SD=8.2$ seconds) than disengagement events ($M=10.0$ seconds, $SD=4.2$ seconds; $F_{1,15=}23.32$, $p<.001$, $\eta_p^2=.609$; Fig. 3). This pattern of results held across the sample: the majority of infants in the English-Spanish condition looked longer at affiliation events than disengagement events ($n=15$ of 16, binomial $p<.001$, two-tailed; Table 1).

Discussion

Overall, infants' responses to the affiliation and disengagement events varied systematically based on the languages that the adults spoke. When the adults spoke two distinct languages, infants looked longer at subsequent affiliation, suggesting this was unexpected. However, the same pattern was not seen when the two adults spoke the same language. When infants heard both adults speak English they looked longer at the disengagement events. These results suggest that infants were more likely to expect affiliation between two people who spoke the same language, English, than two people who spoke different languages, English and Spanish.

In study 2 we evaluated a potential alternative explanation for these findings. Whereas we argue that infants' responses in study 1 are due to expectations based on the actors speaking the same versus different languages, it is possible that infants' differential patterns of looking were due to the fact that one set of displays involved only familiar-language

speakers (English), and one set of displays included an unfamiliar-language speaker (Spanish in addition to English). Perhaps infants found the presence of Spanish surprising or distracting, and thus any expectation they may have had of the two individuals' affiliation was disrupted. If this is the case, infants might find affiliation unexpected in any situation involving an unfamiliar language, regardless of whether or not the two individuals spoke the same or different languages. To ask whether infants found affiliation in the English-Spanish unexpected because the actors spoke different languages, or merely because of the presence of an unfamiliar language (Spanish), we ran another condition where infants were presented with the same two actors both speaking Spanish. If the mere presence of Spanish disrupts infants' expectations about affiliation, then infants should find affiliation unexpected, and the results of the Spanish-Spanish condition should mirror those in the English-Spanish condition. Alternatively, if infants found affiliation unexpected in the English-Spanish condition due their attention to the fact that the two people were speaking two different languages, then infants' pattern of looking in the Spanish-Spanish condition should more closely resemble infants' pattern of looking in the English-English condition.

Study 2

Materials and Methods

Participants—Sixteen 9-month-old infants (9 female; M_{age}= 9 months, 0 days; range= 8;9– 9;16) participated. All infants were from monolingual English-speaking homes according to parental report, and had no regular exposure to non-English languages. No additional infants were tested but excluded.

Procedure—The procedure was identical to Study 1, except the two actors both spoke Spanish. During familiarization, infants watched a video repeat four times. The video featured the same two actors from the first study seated together at a table, facing forward and telling short vignettes. As in Study 1, the actors spoke in positive tones using infant directed speech, and one talked about the weather while the other spoke about grocery shopping. Infants in this *Spanish-Spanish* condition watched videos where both actors spoke Spanish.

Following familiarization, all infants viewed identical test trials to first study. Trained observers coded infants' attention online using jHab. Observers were unaware of participants' condition. For reliability, a second observer coded each infant from video. A correlation between the looking times measured by online observer and the video observer revealed high reliability (r>0.94) between the observers. As a more conservative measure of agreement, we also measured whether the observers judged the same look away from the stimulus as ending the trial; observers agreed on the endpoint of 95% of test trials.

Results

We first evaluated attention during familiarization using the same repeated-measures ANOVA method as in Study 1. Preliminary analyses revealed no effects of participant sex (*p*s>.30) or speaker order (*p*s>.15) during familiarization, so analyses collapsed across these factors. As in Study 1, a repeated measures ANOVA on attention (in seconds) to

familiarization trials with trial number (first, second, third, and fourth) as a within subjects factor revealed significant effect of trial number ($F_{3,45}$=11.76, p<.001, η_p^2=.439), reflecting decreased attention across familiarization trials. Importantly, an ANOVA comparing attention to this study to attention in both conditions of Study 1 (English-English, and English-Spanish) revealed no significant effect of condition ($F_{2,45}$=0.35, p=.677, η_p^2=.017), suggesting infants were equally attentive during familiarization regardless of the languages the actors spoke.

For test trials, a repeated measures ANOVA on the looking times (in seconds) to each test trial with test pair (1st, 2nd, or 3rd) and type (affiliation, disengagement) as within subjects factors did not reveal any significant main effects or interactions. That is, infants in the Spanish-Spanish condition did not look significantly longer at either disengagement events (M=11.3 seconds, SD=5.0 seconds) or engagement events (M=10.8 seconds, SD=4.6 seconds; $F_{1,15}$=0.30, p=.86, η_p^2=.002; Fig. 3). Indeed, there was no significant difference in the number of infants who looked longer at either test movie (n=10 of 16 looked longer at disengagement, binomial p>.4; Table 1).

Although infants in the Spanish-Spanish condition did not show a statistically reliable pattern in their looking times, the pattern of responses in this condition more closely mirrored the English-English condition of Study 1 than the English-Spanish condition of Study 1. In particular, the number of infants in the Spanish-Spanish condition who looked longer at disengagement trials (N=10 of 16) differed significantly from the number of infants in the English-Spanish who looked longer at disengagement trials (N=1 of 16; Fisher's exact test, p<.001, two-tailed), but did not differ significantly from the number of infants in the English-English condition who looked longer at disengagement trials (N=14 of 16; Fisher's exact test, p=.22, two-tailed).

Discussion

Although infants from monolingual English-speaking houses did not display clear expectations about whether two Spanish-speakers would affiliate or disengage, comparing the Sp*anish-Spanish* condition to the *English-English* and *English-Spanish* conditions of Study 1 allows us to draw some conclusions about infants' inferences relating language to social relationships. First, infants expectations that a English speaker will not affiliate with a Spanish speaker are not likely due to infants' finding any type of affiliation involving an unfamiliar speaker unexpected: infants do not look significantly longer at affiliation events between two Spanish speakers. Second, the fact that infants' general pattern of responses, as seen in the nonparametric data, to viewing two Spanish speakers are significantly different from their responses to viewing an English and a Spanish speaker, but not significantly different from their pattern of responses to viewing two English speakers, suggests that infants expect same language speakers to be more likely to affiliate than different language speakers. That is, even though infants did not evidence clear expectations about the relationship between two Spanish speakers, in relative terms they expected two Spanish speakers to be more likely to affiliate than an English speaker and a Spanish speaker.

General Discussion

Before infants speak themselves, they expect spoken language to be an important marker of social relationships. In addition to understanding perceptual differences between languages (e.g., Hohle et al., 2009), the social nature of language (e.g., Beier & Spelke, 2012), and preferring native language speakers (e.g., Kinzler et al., 2007), our study suggests infants use language to make inferences about which people are likely to affiliate with each other. Our findings indicate that a conceptual link between spoken language and social relationships emerges before children have access to explicit cultural beliefs and stereotypes about the social significance of language.

Although our findings suggest that languages people speak influence infants' inferences about whether those people will affiliate, the specific nature of these inferences is still an open question. One possibility is that infants' inferences are related to their understanding of communication. Infants understand that speech communicates information (e.g. Martin, Onishi & Vouloumanos, 2012; Vouloumanos, Marin, & Onishi, 2014), and monolingual infants may expect people to only understand one language (Pitts, Onishi, & Vouloumanos, 2015), suggesting infants in our study may infer relationships between speakers of the same language because they expect those people to be able to communicate. Alternatively, infants might appreciate that languages mark individuals as members of larger social groups (e.g. Labov, 2006). Infants expect members of the same group to share common behaviors or preferences (e.g. Powell & Spelke, 2013; Liberman, Woodward, Sullivan, & Kinzler, submitted). So, if infants' inferences about social relationships are tied to their thinking about social groups more broadly, they might make inferences that people who speak the same language will share common behaviors and preferences, or expect speakers of the same language to participate in a range of social interactions that favor linguistic ingroup members. Further research is needed to investigate these possibilities.

The infants in our sample were from monolingual homes, suggesting direct experience with diverse languages is not required for infants to be able to make inferences about affiliation as related to linguistic diversity. That is, monolingual exposed infants expected familiar language speakers to affiliate, but found it unexpected for speakers of different languages to affiliate. Importantly, these results were not due to mere unfamiliarity of Spanish: infants did not find it unexpected for two Spanish speakers to affiliate. This suggests that infants expect same-language speakers to be more likely to affiliate than different language speakers, even when the same language speakers are using an unfamiliar language (i.e., Spanish). However, experience likely plays a role in shaping language-based social inferences. Infants' inferences about speakers of familiar languages were more robust than their inferences about speakers of unfamiliar languages, suggesting infants may need some exposure to a particular language to form specific expectations about people speaking that language. In this case, we might expect that infants from monolingual Spanish-speaking communities would make stronger inferences about two Spanish speakers than about two English speakers. More generally, our results suggest that infants have the ability to use language to make inferences about social relationships, but that experience with their native language may help them form more robust expectations about familiar-language speakers.

Multilingual language experience may also play an important role in shaping infants' inferences about language. For instance, multilingual exposure influences social cognitive skills such as imitation and perspective taking, even for infants and children who are in predominantly English-speaking homes (e.g. Fan, Liberman, Keysar & Kinzler, 2015; Howard, Carrazza & Woodward, 2014). It is possible that exposure to a multilingual environment would also influence infants' expectations about how language relates to social identity and social relationships. Infants raised in multilingual homes may be less likely to use language as a marker of affiliation since they have experience seeing positive social interactions among people who speak multiple languages. On the other hand, it is possible that even infants from multilingual backgrounds may base their inferences about others' social relationships on those peoples' languages. Future research looking at infants from monolingual non-English speaking homes and from multilingual homes will help elucidate the role of experience on inferences linking spoken language to social relationships.

Our findings also raise interesting questions about which types of similarity guide infants' reasoning about third-party affiliation. When forming expectations about affiliation infants may be particularly sensitive to similarities that likely mark social group. Language and food preferences are socially relevant cues that fundamentally mark cultural group membership and social relationships (e.g. Cohen, 2012; Germov & Williams, 2008). Past research suggests that infants expect people with shared food preferences to be more likely to affiliate than people with opposing food preferences (Liberman, Kinzler, & Woodward, 2014). Taken together with this study, these results suggest that infants are able to use fundamental social markers to make inferences about third party affiliation. It is possible that infants would not use similarities on more arbitrary or socially irrelevant dimensions to reason about affiliation.

These questions aside, the current findings provide the first evidence that infants use a person's spoken language to make third-party social inferences. Infants expect people who speak the same language to be more likely to affiliate than people who speak different languages, providing evidence that they use language to reason about social relationships. Thus, infants appear to be ready to detect linguistic diversity and use this information to form inferences about people and their likely social interactions. Even before infants speak their native language, they see language as a robust cue that can help them understand the social world.

Acknowledgements

References

Babel M, & Munson B (2014). Producing socially meaningful linguistic variation In Goldrick M, Ferreira V, & Miozzo M (Eds.), The Oxford handbook of language production linguistics (pp. 308–2324). New York, NY: Oxford University Press.

Baker MC (2001). The atoms of language: The mind's hidden rules of grammar. New York, NY: Basic Books.

Beier JS, & Spelke ES (2012). Infants' developing understanding of social gaze. Child Development, 83, 486–496. Doi: 10.1111/j.1467-8624.2011.01702.x [PubMed: 22224547]

Buttelmann D, Zmyj N, Daum MM, & Carpenter M (2013) Selective imitation of in-group over out-group members in 14-month-old infants. Child Development, 84, 422428.

Casasanto LS (2010). What do listeners know about sociolinguistic variation? Penn Working Papers in Linguistics, 152: Selected Papers from NWAV 37.

Casstevens RM (2007). jHab: Java Habituation Software (Version 1.0.2) [Computer software], Chevy Chase, MD.

Cohen E (2012). The Evolution of Tag-Based Cooperation in Humans. Current Anthropology, 53(5), 588–616.

Day RR (1980). The development of linguistic attitudes and preferences. TESOL Quarterly, 14(1), 27–37.

Fan SP, Liberman Z, Keysar B, & Kinzler KD (2015). The exposure advantage: early exposure to a multilingual environment promotes effective communication. Psychological Science, 26 (7), 1090–1097. [PubMed: 25956911]

Germov J, & Williams L (2008). A sociology of food and nutrition: The social appetite. Melbourne, Australia: Oxford University Press.

Giles H, & Billings AC (2004). Assessing language attitudes: Speaker evaluation studies In Davies A & Elder C (Eds.), The handbook of applied linguistics (pp. 187–209). Malden, MA: Blackwell.

Glusek A, & Dovidio JF (2010). The way they speak: A social psychological perspective on the stigma of nonnative accents in communication. Personality and Social Psychology Review, 14(2) 214–237. doi: 10.1177/1088868309359288. [PubMed: 20220208]

Henrich J, & Henrich N (2007). Why humans cooperate: A cultural and evolutionary explanation. New York, NY: Oxford University Press

Hirschfeld LA, & Gelman SA (1997). What young children think about the relationship between language variation and social difference. Cognitive Development, 12(2), 213–238.

Höhle B, Bijeljac-Babic R, Herold B, Weissenborn J, & Nazzi T (2009). Language specific prosodic preferences during the first half year of life: Evidence from German and French infants. Infant Behavior and Development, 32(3), 262–274. [PubMed: 19427039]

Howard LH, Carrazza C, & Woodward AL (2014). Neighborhood linguistic diversity affects social learning in infants. Cognition, 133, 474–479. [PubMed: 25156630]

Johnson SC, Dweck C, Chen FS, Ok SJ, Stern HL, & Barth ME (2010). At the intersection of social and cognitive development: Internal working models of attachment in infancy. Journal of Cognitive Science, 34(5), 807–825.

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

Kinzler KD, & DeJesus JM (2013a). Northern=smart and Southern=nice: The development of accent attitudes in the U.S. Quarterly Journal of Experimental Psychology, 66, 1146–1158

Kinzler KD, & DeJesus JM (2013b). Children's sociolinguistic evaluations of nice foreigners and mean Americans. Developmental Psychology, 49, 655–664. [PubMed: 22686180]

Kinzler KD, Dupoux E, & Spelke ES (2007). The native language of social cognition. Proceedings of the National Academy of Sciences of the United States of America, 104(30), 12577–80. [PubMed: 17640881]

Kinzler KD, Dupoux E, & Spelke ES (2012). Native objects and collaborators: Infants' object choices and acts of giving reflect favor for native over foreign speakers. Journal of Cognition and Development, 13, 67–81. [PubMed: 23105918]

Kinzler K, Shutts K, DeJesus J, & Spelke E (2009). Accent trumps race in guiding children's social preferences. Social Cognition, 27(4), 1–11.

Kinzler KD, & Spelke ES (2011). Do infants show social preferences for people differing in race? Cognition, 119, 1–9. [PubMed: 21334605]

Kuhlmeier VA, Wynn K, & Bloom P (2003). Attribution of dispositional states by 12-Month-Olds, Psychological Science, 14 (5), 402–408. [PubMed: 12930468]

Labov W (2006). The social stratification of English in New York city. Cambridge University Press.

Liberman Z, Kinzler KD, & Woodward AL (2014). Friends or foes: Infants use shared evaluations to infer others' social relationships. Journal of Experimental Psychology: General, 143(3), 966–971. doi: 10.1037/a0034481. [PubMed: 24059843]

Liberman Z, Woodward AL, Sullivan KR, & Kinzler KD (submitted). An earlyemerging system for reasoning about the social nature of food.

Martin A, Onishi KH, & Vouloumanos A (2012). Understanding the abstract role of speech in communication at 12-months. Cognition, 123(1). 50–60. [PubMed: 22209584]

Mascaro O, & Csibra G (2012). Representation of stable social dominance relations by human infants. Proceedings of the National Academy of Sciences, 109(18), 6862–6867. doi: 10.1073/pnas. 1113194109.

Mascaro O, & Csibra G (2014). Human infants' learning of social structures: The case of dominance hierarchy. Psychological Science, 25(1). 250–255. doi: 10.1177/0956797613500509. [PubMed: 24220623]

Pietraszewski D, & Schwartz A (2014). Evidence that accent is a dimension of social categorization, no a byproduct of coalitional categorization. Evolution and Human Behavior, 35, 51–57.

Porter SC, Rhineschmidt-Same M, & Richeson JA (in press). Inferring identity from language: Linguistic intergroup bias informs social categorization. Psychological Science.

Powell LJ, & Spelke ES (2013). Preverbal infants expect members of social groups to act alike. Proceedings of the National Academy of Science, 110(41), E3965–E3972. doi: 10.1073/pnas. 1304326110.

Rakic T, Steffens MC, & Mummendey A (2011). Blinded by the accent! The minor role of looks in ethnic categorization. Journal of Personality and Social Psychology, 100(1), 16–29. doi: 10.1037/a0021522. [PubMed: 21038973]

Shutts K, Kinzler KD, McKee CB, & Spelke ES (2009). Social information guides infants' selection of foods. Journal of Cognition and Development, 10(1–2), 1–17. [PubMed: 19809590]

Figure 1.
Familiarization conditions. This figure displays still images from videos of the conditions from both studies. The speech bubbles depict the beginning of each actor's vignette. In all familiarization movies the two actors sat together, but never directly interacted, they instead speak one at time while facing forward. The English-English and English-Spanish conditions were presented in Study 1, and the Spanish-Spanish condition was presented in Study 2.

Figure 2.
Test trials. This figure displays still images from the end of the videos of each type of test trial. Looking times were recorded to these still images.
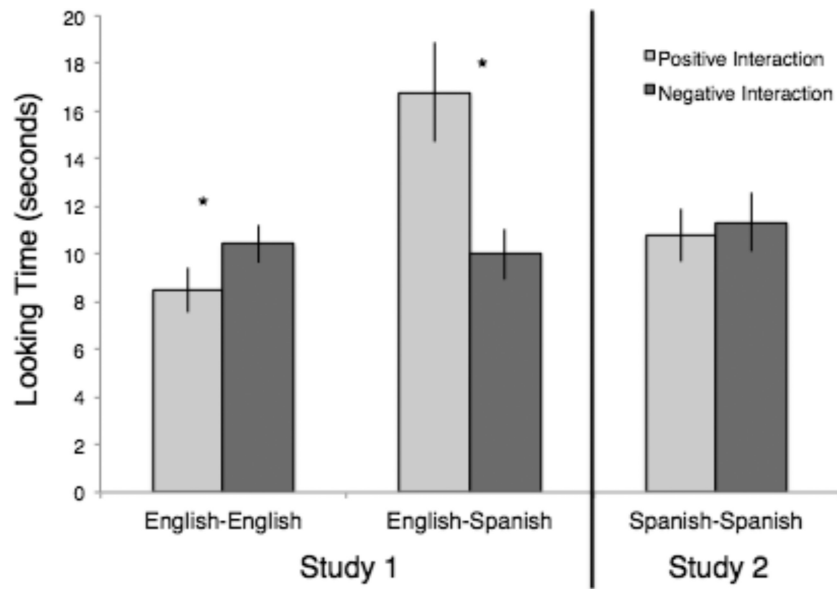
Figure 3.
Looking times to test trials. This graph depicts the average looking time to positive (affiliation) and negative (disengagement) interaction trials for infants in each condition. Error bars represent the standard error of the mean looking time. Asterisks indicate a significant difference in the individual ANOVAs for each condition.

Table 1.

Number of infants looking longer to each type of test trial by condition.

	Positive Engagement	Disengagement	Binomial probability
English-English	2	14	p<.001
English-Spanish	15	1	p<.001
Spanish-Spanish	6	10	n.s.