Neighborhood linguistic diversity predicts infants' social learning

Lauren H. Howard *, Cristina Carrazza, Amanda L. Woodward

University of Chicago, Chicago, IL, United States

ABSTRACT

Infants' direct interactions with caregivers have been shown to powerfully influence social and cognitive development. In contrast, little is known about the cognitive influence of social contexts beyond the infant's immediate interactions with others, for example, the communities in which infants live. The current study addressed this issue by asking whether neighborhood linguistic diversity predicts infants' propensity to learn from diverse social partners. Data were taken from a series of experiments in which 19-month-old infants from monolingual, English-speaking homes were tested in paradigms that assessed their tendency to imitate the actions of an adult who spoke either English or Spanish. Infants who lived in more linguistically diverse neighborhoods imitated more of the Spanish speaker's actions. This relation was observed in two separate datasets and found to be independent from variation in infants' general imitative abilities, age, median family income and population density. These results provide novel evidence suggesting that infants' social learning is predicted by the diversity of the communities in which they live.

© 2014 Elsevier B.V. All rights reserved.

1. Introduction

Social environments powerfully shape early cognitive development. A large body of research has demonstrated that infants' immediate social interactions with parents, teachers or caregivers influence diverse cognitive achievements, including language learning (e.g., Hoff, 2003; Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002; Rowe, 2012), spatial cognition (e.g., Pruden, Levine, & Huttenlocher, 2011), theory of mind (e.g., Meins et al., 2002), number knowledge (e.g., Levine, Suriyakham, Rowe, Huttenlocher, & Gunderson, 2010), and culturally-specified practices (see Rogoff, Paradise, Mejía Arauz, Correa-Chávez, & Angelillo, 2003). In contrast, little is known about the cognitive influence of social contexts beyond the infant's immediate interactions with others. Dominant perspectives on early social cognitive development have stressed the central importance of infants' direct interactions with social partners (e.g., Carpendale & Lewis, 2004; Csibra & Gergely, 2009; Dunn, 1988; Tomasello, 1998), and consequently there has been little investigation of the influence that distal social contexts may have. Nevertheless, infants routinely experience their broader neighborhood environment, for example, at the park, on the bus, or in the supermarket. Do these experiences affect their social cognitive development? In the current study, we investigated this issue by asking whether neighborhood linguistic diversity affects infants' propensity to learn from diverse social partners.

One way in which neighborhood demographics could influence young learners is by shaping their openness to social informants. Recent findings indicate that infants and young children are discriminating social learners-they resist attending to and taking information from foreign or

* Corresponding author. Address: University of Chicago, Psychology Department, 5848 S. University Ave, Chicago, IL 60637, United States. Tel.: +1 773 834 9791.

E-mail address: lhhoward@uchicago.edu (L.H. Howard).

foreign-accented speakers (Buttelmann, Zmyj, Daum, & Carpenter, 2013; Howard, Henderson, Carrazza, & Woodward, in press; Howard, Henderson, & Woodward, in preparation; Kinzler, Corriveau, & Harris, 2011; Kinzler, Dupoux, & Spelke, 2007). Thus, from early in life, infants and young children appear to form expectations about the kinds of people that they should learn from and imitate. While this tendency could reflect a drive to acquire socially relevant knowledge (Henderson, Sabbagh, & Woodward, 2013), it could also restrict children's access to potentially valuable information and contribute to the development of social biases.

We recruited data from 4 prior experiments with 19-month-old infants in order to evaluate whether neighborhood diversity mitigates this learning bias in infants. The 4 experiments were drawn from two sets of studies that examined age and medium effects on infants' willingness to imitate informants who spoke their own native language (English) versus a foreign language (Spanish) (Howard et al., in press, in preparation). These studies found that infants and young children resisted foreign-speaking informants in some cases, but also found that, when presented with a live (rather than video) informant, 19-month-old infants were equally likely to imitate the actions of Spanish- and English-speaking experimenters. In the analyses presented here, we pooled data from these experiments to evaluate whether variation in neighborhood linguistic diversity predicted infants' responses to the foreign speaker. We selected infants who heard only English in their interactions with caretakers. These infants lived in neighborhoods with varying degrees of linguistic diversity. By examining the relation between neighborhood linguistic diversity and infants' propensity to imitate the foreign speaker, we were able to test whether language information available outside of the home affects infants' social learning. That is, these experiments provided the opportunity to isolate the potential effects of the social environment beyond the child's immediate interactions with caretakers and family members.

2. Method

2.1. Participants

Data were drawn from four experiments investigating 19-month-old infants' imitation of native-versus foreign-language speakers (Howard et al., in press, in preparation). Participants were full-term 19-month-old infants from English-speaking monolingual households in the Washington, D.C. and Chicago metro areas. Participant ages and demographic information are summarized in Table 1.

All participants heard a minimum of 95% English in their daily lives, and heard only English from their parents and caretakers according to parent report. The majority (70%) were reported to have *no* exposure to a language besides English. The remaining participants had received incidental exposure to languages other than English, for example from seeing a television show, meeting a family visitor, or learning a song in a music class. Parents of these children estimated that this incidental exposure accounted for an average of 2.7% of their children's language input.

Postal zip codes from parent-provided reports were used as a neighborhood proxy. Information regarding both the prevalence of all non-English languages present in the neighborhood (calculated by the proportion of neighborhood households that reported speaking non-English languages), along with the prevalence of Spanish in the child's neighborhood (calculated by the proportion of neighborhood households that reported speaking Spanish), was derived from the 2006 to 2010 *American Community Survey* (US Census Bureau, 2006–2010). Median neighborhood family income was derived from the 2010 *Census of Population and Housing* survey (US Census Bureau, 2010) (see Table 1), and population density was computed by dividing the total population by the square miles in the participant's zip code (US Census Bureau, 2010). Since all participants lived in or near diverse U.S. cities, there was significant variability in the prevalence of non-English languages present in infants' neighborhoods.

2.2. Procedure

To determine whether infants met the criteria for inclusion, parents were given a short language exposure questionnaire that asked them to list each language that the infant had heard, and to describe the nature of the infant's contact with the language, including the percent of time the language was heard and who spoke the language (e.g., parent, teacher, neighbor).

Infants were tested in either in a between-subjects or a within-subjects imitation paradigm. Data were combined according to paradigm type (between- or within-subjects), resulting in two datasets and two sets of analyses as described below. In the between-subjects paradigm (dataset 1), infants observed either an English-speaking or a Spanish-speaking experimenter perform actions on a series of novel toys (see Table 2 for a description of the toys and

Table 1
Participant and demographic information for study samples 1 and 2.

Analyses	Condition	N	Females	Males	Age in Mos	% "Other" Language	Median family income (per year)	Population density (people/square mile)
Between-subjects	Spanish	25	14	11	19.24 (±0.28)	20.84 (±11.65)	$89,740.16 (±$28,136.68)	4230.31 (±2328.09)
	English	25	13	12	19.11 (±0.27)	22.57 (±14.49)	$92,725.72 (±$27,336.25)	4596.96 (±2926.92)
	Total	50	27	23	19.19 (±0.28)	21.70 (±13.04)	$91,232.94 (±$27,496.22)	4413.63 (±2657.99)
Within-subjects	–	32	18	14	19.29 (±0.60)	18.67 (±14.81)	$70,780.88 (±$29,425.45)	7995.30 (±7243.76)

Note: For between-subjects analyses, planned contrasts revealed no significant differences between conditions in relation to: the percent of other languages present in the participant's neighborhood ($t(48) = .47$, $p = .57$), neighborhood median income ($t(48) = .38$, $p = .70$), or neighborhood population density ($t(48) = 1.23$, $p = .23$). In the within-subjects analyses, there were no conditions and therefore no demographic differences to examine.