

## Effects of Bilingualism on Infants' Sensitivity to Ground Information

Languages encode semantic information in different ways. For example, when conveying actions and events via verbs, some languages regularly encode ground-path information within the verb (e.g., Japanese), while other languages do not (e.g., English). Japanese has different ground-path verbs based on whether the ground over which the agent moves is bounded (e.g., a street) or unbounded (e.g., a field). Both English and Japanese reared infants at 14 months can discriminate between these ground-path contrasts in nonlinguistic motion events (Göksun et al., 2011; Konishi et al., 2019). Infants at this age only discriminated across-category ground path distinctions (i.e., unbounded vs. bounded grounds) and did not discriminate between within-category ground path distinctions (i.e., two different bounded grounds). By 19 months, only Japanese-learning infants could discriminate across-category ground path contrasts, reflecting 'semantic narrowing' in English infants. Apparently, with increasing age, infants' perceptual sensitivities for motion events aligns with the properties of their language. This development is analogous to phonological narrowing, a similar transition from language-general to language-specific sensitivity to phonetic contrasts. Here, we investigated semantic narrowing in bilingual infants. Adopting Göksun et al.'s design, we presented English-Mandarin bilingual infants at 14- and 19-months with silent videos of motion events in a familiarization-preference paradigm. Neither English nor Mandarin routinely contrasts ground path information verb-internally.

Monolingual English-exposed infants ( $N=32$ ) were familiarized with a motion event (e.g., a person walking across a railroad track) and tested on discrimination of the familiarized event and a novel across-category ground path contrast (e.g., a person walking across an open field). A one-way ANOVA with age as a factor and preference for the novel display as the dependent variable revealed a main effect of age ( $F(1, 31) = 5.43, p=.02$ ) such that only 14-month-olds (but not 19-month-olds) exhibited above-chance fixation to the novel event ( $t(15) = 2.44, p=.03$ ), replicating Göksun et al. in a bilingual society (Figure 1).

We then tested English-Mandarin bilingual infants on sensitivity to ground-path distinctions at 14- ( $N=32$ ) and 19-months ( $N=32$ ). For bilingual infants, we tested participants on both within- and across-category distinctions. Half the infants viewed a within-category contrast and half viewed an across-category contrast. A 2 x 2 (age x condition) ANOVA showed no significant effect of age ( $p = .21$ ), no effect of condition ( $p = .87$ ), and no interaction of condition and age ( $p=.79$ ). Comparisons to chance showed that bilingual infants did not differentiate within- ( $p=.58$ ) or across-category ( $p=.46$ ) contrasts at 14-months. However, at 19-months, they differentiated both within- and across-category distinctions (within-category:  $t(15) = 2.54, p=.02$ ; across-category:  $t(15) = 2.19, p=.045$ ). A follow-up study was conducted with 24-month-old bilingual infants ( $N=32$ ), revealing that 24-month-old bilingual infants no longer differentiated within-category ( $p=.79$ ) or across-category distinctions ( $p=.29$ ) (Figure 2).

Results suggest that bilingual infants differ from monolingual infants in their sensitivity to ground-path information, demonstrating sensitivity to *both* between- and within-category distinctions at 19-months. Bilingual infants also did not demonstrate semantic narrowing between 14- and 19-months, but instead showed increased sensitivity to ground-path distinctions at 19 months. Bilingual exposure may delay awareness of semantic distinctions as suggested for phonological distinctions (Bosch & Sebastián-Gallés, 2003; Garcia-Sierra et al., 2011) and may heighten children's attention to many possible semantic contrasts, as reported for phonological perception (Singh, 2018). Three important findings are suggested: 1) infants can discriminate between ground-path motion events before language production; 2) monolingual infants discriminate only across ground-path categories at 14-months while bilingually-exposed infants discriminate both within- and across ground-path category

distinctions at 19-months; and 3) semantic narrowing (age-related decline in motion event discrimination) occurs later in bilingual than monolingual infants.

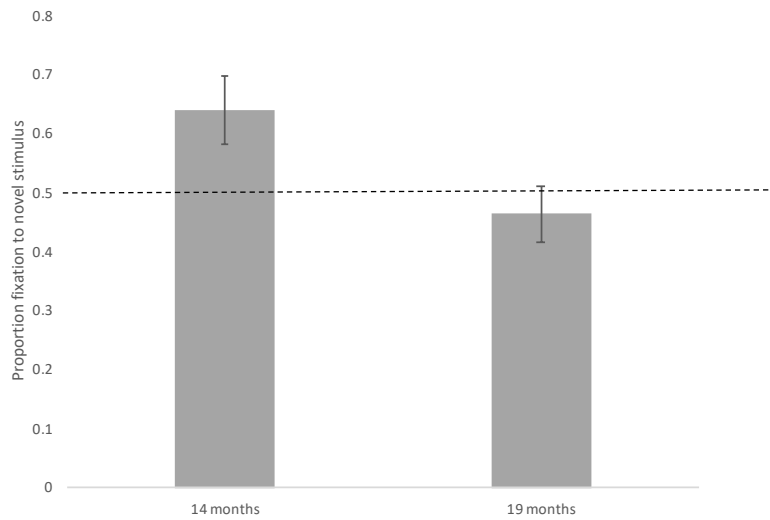


Figure 1: Proportion fixation to novel nonlinguistic events (across-category ground path contrasts) in monolingual infants. Dashed line indicates chance fixation and error bars indicate *SEM*.

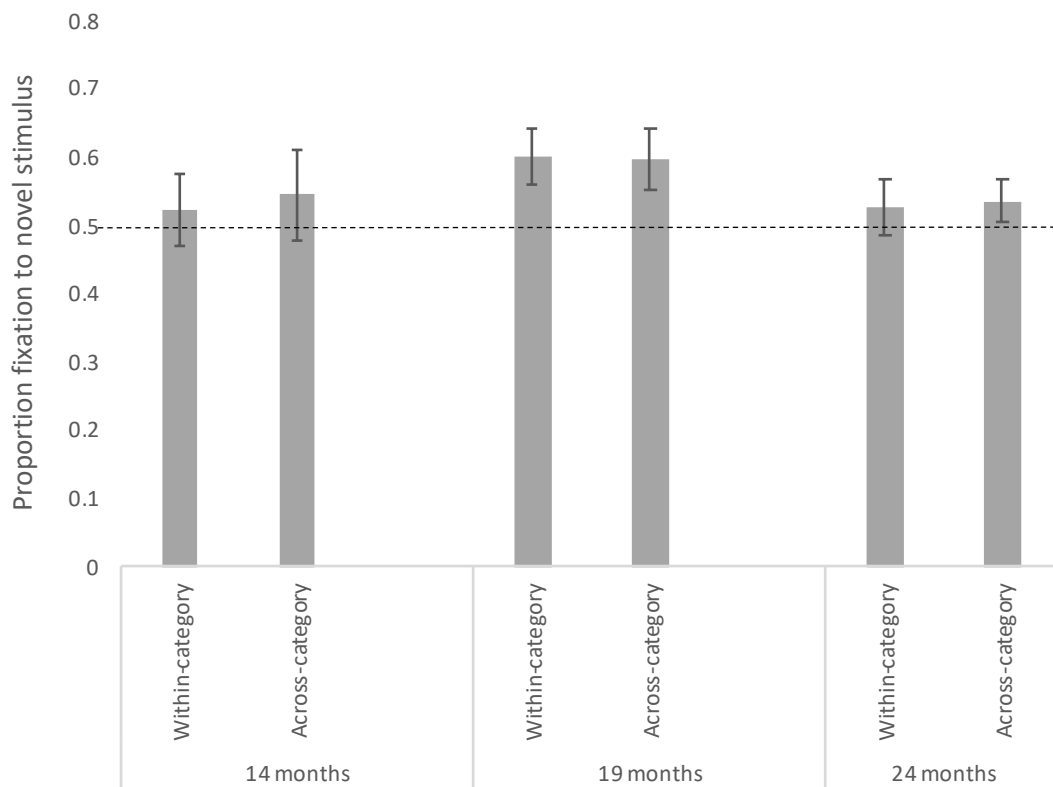


Figure 2: Proportion fixation to novel event (within- and across-category ground path contrasts) in bilingual infants by age group. Dashed line indicates chance fixation and error bars indicate *SEM*.