Speech prosody across language backgrounds

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This study investigated how prosody production in bilinguals' dominant language compares to that of monolingual speakers of that same language (here, English). This issue speaks to whether bilinguals' two languages are represented and used within separate or shared systems (e.g., Dijkstra et al., 2019; Hartsuiker, Pickering, & Veltkamp, 2004; Kroll & Stewart, 1994). In relation to prosodic representation and use, this issue has received very little attention. One of the few previous studies found that Spanish-English bilinguals differed from monolinguals of both Spanish and English in phrasal measures of duration and pitch (Fernandez, 2017), suggesting non-encapsulated representation of prosody in bilinguals. Similarly, here we compared the production of Intonational Phase Boundaries (IPBs), or pauses, in high- and low-attachment sentences by Spanish-English bilinguals and English monolinguals. In ambiguous sentences (such as 1, below), production of an IPB between the second noun (i.e., *man*) and the relativizer (*who*) increases the likelihood that comprehenders will infer a high-attachment interpretation of the sentence (i.e., the relative clause is referring to the girlfriend, rather than the man) (Shattuck-Hufnagel & Turk, 1996). Importantly, without prosody, native Spanish speakers tend to infer a high attachment interpretation of ambiguous sentences such as these, whereas native English speakers tend to infer a low attachment interpretation (Carreiras & Clifton, 1999). In bilinguals, IPB (pause) production may serve as an indicator of whether the prosodic tendency of one language influences the use of prosody in the other language. An influence of Spanish on the English prosody of bilinguals could manifest as a greater tendency to produce an IPB before the relative clause in Spanish-English bilinguals relative to English monolinguals.

First, American English monolinguals and (English-dominant) Spanish-English bilinguals engaged in a natural conversation task in order to account for variability in speaking rate within and across these groups. Next, participants engaged in a sentence task where they produced relative clause utterances such as (1), elicited as follows. Participants first read aloud the main clause stem of a target sentence (2, below) presented on the computer screen. The experimenter then produced a prompt that cued high (3a) or low attachment (3b); thus, participants were always constrained in what attachment type to produce. "Speak" on the computer screen then cued the participant to combine the stem and prompt to produce the target (1). Blind to condition, the experimenter coded whether a perceptible IPB was produced between the second noun of the complex noun phrase and the relative clause of the target utterance (Figure 1). Logit mixed-effects models were used to predict the presence of an IPB at this region based on language group and attachment condition (high vs. low). Participants' English and Spanish proficiency was assessed with tests of productive vocabulary (Multilingual Naming Test (MINT), Gollan et al., 2012) and grammar knowledge (Michigan English Language Institute College English Test and Diploma of Spanish as a Foreign Language), and a language history questionnaire (Figure 2).

1. The magician surprised the girlfriend of the man who plays guitar in a band.
2. The magician surprised the girlfriend of the man.
3a. (*high-attachment prompt*) Which girlfriend? The one who plays guitar in a band.
3b. (*low-attachment prompt*) Which man? The one who plays guitar in a band.

Initial analyses from 22 bilinguals and 29 monolinguals[1] revealed a non-significant ($p = 0.14$) trend towards an interaction where bilinguals tended to produce more pauses than monolinguals in the high attachment sentences (47% vs. 35%). Further analyses will include measures of speech rate (to account for variability in speech rate in the observed trend), as well as durational measures of pre- through post-boundary word production and measures of pitch on the pre-boundary word, to ensure that IPB coding reflects real differences, and to better understand the nature of such differences. More evidence for the current trend in these analyses would suggest that representations of Spanish prosodic tendencies influences bilinguals' use of prosody in English. This is generally consistent with shared rather than encapsulated representational prosodic and language systems.
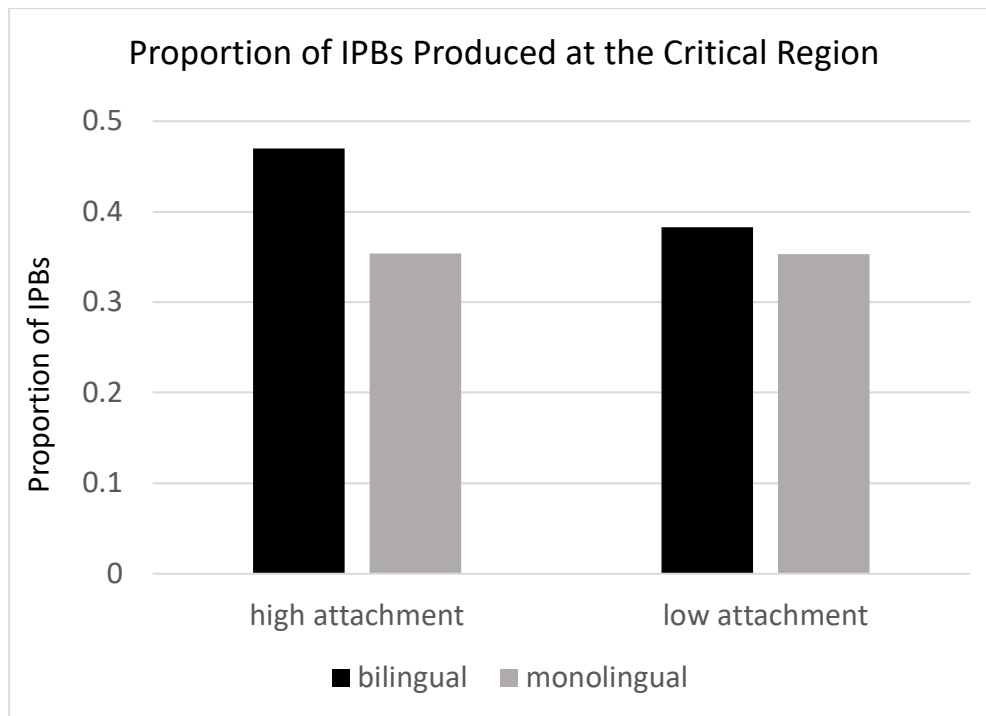
Figure 1. Proportion of IPB production at the critical region broken down by language group (monolingual, N = 29, vs. bilingual, N = 22) and target sentence condition (high vs. low attachment).
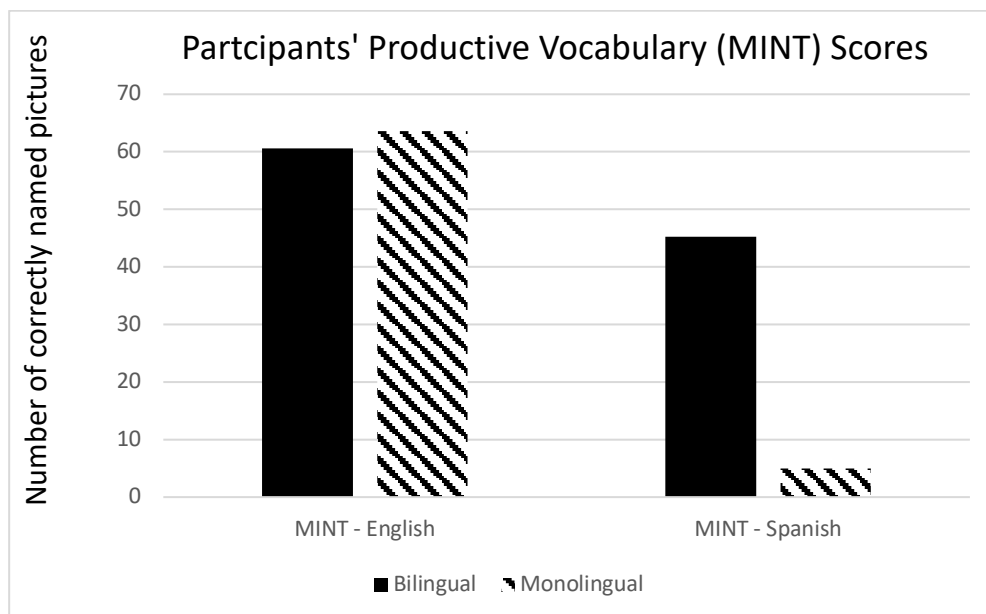

Figure 2. Participants' mean objective proficiency scores on the Multilingual Naming Test (MINT), for Monolingual (n=29) and Spanish-English bilingual (n=22) participants. The maximum score is 68.