Voicing of intervocalic fricatives in conversational Spanish

Francisco Torreira & Mirjam Ernestus
Radboud Universiteit Nijmegen & Max Planck Institute for Psycholinguistics
Francisco.Torreira@mpi.nl  Mirjam.Ernestus@mpi.nl

Recent studies have shown that phonologically voiceless stops in Spanish are often phonetically voiced in intervocalic position (e.g. Lewis 1999 among others). The present study investigates if intervocalic voicing also affects Spanish fricatives (/θ/, /ʃ/, /s/, /x/). For /s/, the most frequent fricative consonant, and one which can carry morphosyntactic information as a suffix (e.g. las alas ‘the wings’), we also investigate the conditioning factors of intervocalic voicing.

Over two thousand vowel-fricative-vowel sequences were randomly extracted from the Nijmegen Corpus of Casual Spanish (Torreira & Ernestus 2010). The occurrence of voicing in each fricative consonant was estimated automatically using the pitch detection algorithm available in Praat. Intervocalic voicing affected all fricative consonants: 26% for /θ/, 16% for /x/, 29%, for /θ/, and 34% for /s/. This indicates that intervocalic voicing is a recurrent phenomenon in Spanish voiceless fricatives, and that it is not restricted to voiceless stops.

In order to investigate the conditioning factors of the voicing of /s/, we further extracted 1233 /s/ consonants with specific characteristics (e.g. in word-final position, in specific words). As potential conditioning factors, we considered a number of control factors (e.g. speaker, gender, speech rate, segmental context, stress), morphological factors, word class (function vs. content words), and word frequency.

Our regression modeling revealed great variability among speakers, with some exhibiting no or infrequent voicing, and other reaching voicing rates above 80%. Voicing tended to occur more often at faster speech rates, in shorter consonants and in word-final position. Interestingly, we also found that /s/ onset consonants followed by another /s/ onset in the following syllable (e.g. as in qué sosa ‘how bland’) were significantly more prone to voicing than /s/ consonants in other segmental contexts. This repetition effect was more pronounced in unstressed consonants. Figure 1 illustrates the effects of speech rate, gender, word position, stress and segmental context.

Finally, we investigated the roles of frequency, word class and morphosyntactic factors. Contrary to previous research showing more reduction in frequent vs. infrequent words, and in function vs. content words (Bell et al. 2009), we did not observe general effects of word frequency or word class in our data. Instead, we found that the medial /s/ in nosotros and the initial s in sabes, two high-frequency words, were voiced more often than /s/ in other words. As for morphological factors, we found that voicing tended to occur more often in /s/ suffixes which were morphosyntactically redundant (e.g. 3rd /s/ in las casas esas ‘those houses’) than in other word-final /s/ consonants (56% vs. 48%), indicating that functional factors may play a role in reduction phenomena (Kiparsky 1972).

We conclude that intervocalic voicing affects Spanish voiceless obstruents in general, and that it is conditioned by several factors known to affect other reduction phenomena.
Figure 1 Percentage of voicing in intervocalic /s/ consonants as a function of speech rate and consonant duration (standardized, centered and discretized in five intervals of equal length), gender, word position, stress and the identity of the consonant following the /VsV/ sequence.

References


