

Reducing /voiceless stop + vowel/ sequences in French and Spanish

Speech reduction is often regarded as a universal phenomenon arising from articulatory and perceptual mechanisms. Recurrent paths of diachronic lenition phenomena support this view. However, speech reduction is also language-specific to a considerable extent. For instance, intervocalic voiceless consonants in Spanish are frequently realized as voiced approximants [1], but no such tendency has been reported for French. On the other hand, unaccented French vowels may become extremely short and completely devoiced [2], but frequent vowel devoicing has not been reported for Spanish. These observations suggest that even between related languages CV sequences may differ significantly in how they are reduced.

The present work directly compares the realization of /voiceless stop + vowel/ sequences in Spanish and French in order to determine common and differing reduction patterns. Given the literature, we expect these CV sequences to exhibit more consonantal reduction in Spanish, and more vocalic reduction in French. Importantly, our data come from corpora of highly spontaneous speech, the Nijmegen Corpus of Casual French [3] and The Nijmegen Corpus of Casual Spanish [4], recorded using a similar procedure and equipment.

V1.C1V2.C2 sequences in which C1 was a voiceless stop and V2 an accented or unaccented /aeiou/ vowel were extracted from the Spanish ($n = 1298$) and the French ($n = 856$) corpora. Duration measurements included the stop closure and the vocalic part of C1V2 syllables. The occurrence of incomplete stop closures was also annotated. Voicing was detected automatically. F1 and F2 were measured at the point of maximum F1 in V2.

Our results support the hypothesis that voiceless stops undergo significantly more reduction in Spanish than in French. The percentage of incomplete closures in Spanish was 25.5%, versus only 5.4% for French. Moreover, all incomplete closures were voiced in Spanish, but in French most of them (55%) exhibited a voiceless portion. For stops with a complete closure, durations were shorter, and voicing was longer in Spanish than in French ($p < .0001$ in both cases). Accent had similar effects in both languages, making incomplete closures less likely and closure durations longer ($p < .0001$ in both cases).

Vowels yielded more mixed results. As expected, a considerable proportion vowels (25.8% of unaccented high vowels) in French were completely devoiced, but only a few cases of vowel devoicing were observed in Spanish. On the other hand, contrary to our expectations, vowels in French were generally longer than in Spanish, including high vowels ($p < .0001$). Regarding formant values, we found that the vowel space tended to be higher in French than in Spanish ($p < .001$ for all the vowel categories examined), suggesting that French vowels are generally produced with a more constricted vocal tract than Spanish vowels. As for F2, we found that back vowels tend to be more centralized in French than in Spanish. Accent had similar effects for both languages, making F1 values higher and F2 values more peripheral. These results indicate that French vowels show more reduction than Spanish vowels in the realization of voicing and in sonority (lower F1), but not necessarily in terms of duration.

Taken together, our results reveal strong language-specific patterns of reduction, even for phonologically similar sound sequences in two related languages (e.g. voicelessness in stops is realized much more faithfully in French than in Spanish, even at the expense of the voicing of following high vowels). In our presentation, we will discuss some possible origins of these differences (e.g. specification and organization of phonetic categories within each language, different articulatory bases). Our data also remind us that reduction does not necessarily affect all characteristics of segments, and that, for this reason, the study of speech reduction should always consider multiple phonetic parameters independently.

References

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