

Spanish speakers' perception of French vowel contrasts: Behavioral and ERP evidence.

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The present study examined native Spanish speakers' perception of non-native vowel contrasts. Spanish with 5 vowels, has a relatively sparse system compared to French, which has 10 oral and 5 nasal vowels. In principle, Spanish speakers could simply use a single category to encompass two or more French vowel contrasts. The present study shows this hypothesis to be false and shows that Spanish speakers are capable, without hesitation, to perceive and classify vowels that are absent from their vocalic repertoire.

Behavioral experiments: production of native Spanish vowels, perception of foreign, French vowels.

Participants: Fifteen Native Spanish speakers, in Spain, with no knowledge of French

Materials and Procedure: Perception: Auditory presentation of Spanish, English (not shown here) and French isolated oral vowels (n=10 vowels, 10 exemplars of each). Task : identify vowels using Spanish vowel categories. Production: produce isolated vowels and in context (words and sentences) of native language, Spanish.

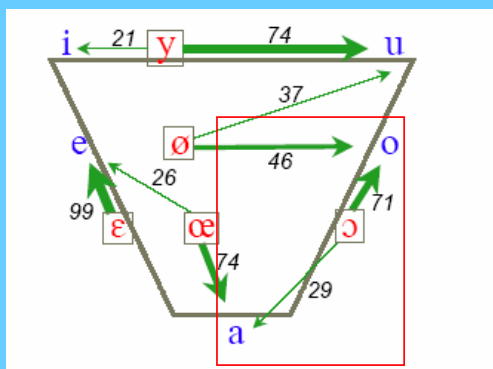
ERP study: auditory perception

Participants: Fifteen Hispanic native speakers, bilingual in French. Mean age 23.8

Set up: 32 channel ElectroCap. EEG recorded from 21 channels referenced to the left mastoid with a sampling rate of 200 Hz. Auditory stimuli presented for 200 ms, inter-trial interval of 1200 ms.

Procedure and Materials: 3 stimulus oddball paradigm.

Background /o/ (75%), target /e/ (10%), oddball /ɔ/.



Spanish native speakers' categorisation of French vowels (in red) according to the five Spanish categories (in blue).

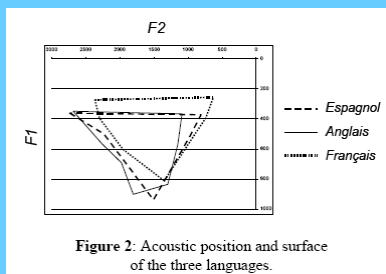
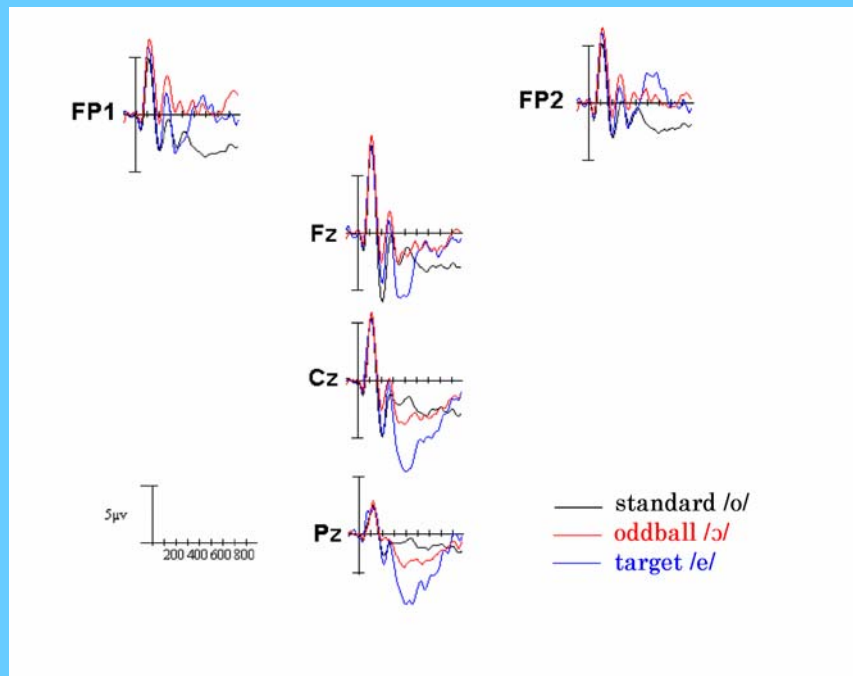


Figure 2: Acoustic position and surface of the three languages.

Spanish native speakers' production of vowels (/e/, /o/, /i/, /u/, /a/), versus French and English speakers' production. Spanish is slightly more fronted and open than French.



Spanish-French bilinguals' ERP response to the oddball vowel /ɔ/ against the background vowel /o/. Significant differences were found for the N100, the N200 and the P300 response, all three being larger in amplitude but similar in latency and distribution, to the vowel /ɔ/ than to /o/.

Both our behavioral and electrophysiological data revealed that Spanish native speakers have distinct perceptual categories for the French vowels /o/ and /ɔ/. Rather than simply grouping these two vowels in a single category, Spanish speakers assimilate the French mid-open vowel /ɔ/ to two categories: predominantly /o/ but in 30% of cases to /a/. The mid-open French vowels (/ɔ/ /ε/), absent from Spanish, are in general assimilated to mid-closed vowels, in line with Spanish speakers' production of Spanish. Spanish-French bilingual participants' ERP trace also show clear discrimination of the French vowel contrast /o/ and /ɔ/. All three components, the N100, linked to acoustic differences, the N200, linked to attentional processing, and the P300, linked to conscious updating, were significantly impacted by the processing of the non-native vowel contrast, even under conditions where participants were not informed of the presence of the "oddball" /ɔ/.