

On-going mixing of vowel categories in verbal morphology in Brazilian Portuguese: The importance of fine phonetic detail

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Introduction

Recent studies have shown the role of fine phonetic detail in shaping representations (Johnson 1997, Pierrehumbert 2001, Foulkes & Docherty 2006), most of them involving production (Bybee, 2001, 2010; Munson et al 2010). In this paper, we examine the role of fine phonetic detail in sound change with focus on perception, in particular a case which involves the merging of vowels in verbal morphology in Brazilian Portuguese (BP). Nouns are not affected, indicating that fine phonetic detail is particular to specific morphological categories (Losiewicz, 1992). We also examine different age groups in order to understand the behavior of the innovative merging in verbal morphology. This result indicates that fine phonetic detail in perception is relevant in ongoing sound changes.

Methods & Materials

Cohort. A total of 29 subjects took part in the experiment, who were separated into two age classes: young subjects (19 to 25 years old) and old subjects (45 to 59 years old). **Stimuli.** A young (28 year old) and an older (53 years old) speaker recorded the stimuli to be tested in four sentences containing the words /lavə/ vs. /levə/ (verbs) and /salə/ vs. /selə/ (nouns). In each pair of sentences the stimuli differ only by the vowels /a/ and /ɛ/. The sentences were then interpolated using an acoustic morphing algorithm (developed by the authors) that preserves the naturalness of the sentence and produces a continuum between the two vowels. **Procedure.** Identification tasks were done by the subjects. For each pair of sentences, the subjects heard 80 interpolated stimuli, covering the continuum /a/-/ɛ/, and made a forced choice between the two possible words. Psychometric curves were fitted to the responses and the slopes of the curves were taken as the independent variable of the analysis. The slope of the psychometric fitting curve can be considered as an indication of the amount of confusion be-

tween the two vowels. Small slopes would indicate a stronger vowel mixing.

Results & Discussion

A mixed-effects linear model was fitted to the data. The fixed factors were the *age group* of the subjects (young vs. old), the *identity of the speaker* (young vs. old), and the *grammatical class* (verb vs. noun). Subjects were considered as a random factor. The results are shown in the figure below. The dots denote the means and the vertical bars represent the standard errors for each case. The identity of the speaker has a significant effect on the slope, the old speaker inducing lower values ($p < 0.01$). However, there is no significant effect in the interaction between the speaker identity and the other factors. There is no global effect for the individual factors age group and grammatical class. On the other hand, we found a significant effect for the interaction factor age group *vs.* grammatical class ($p < 0.05$). For the noun pair there is almost no difference in slope between the two age groups. However, for the verb pair, old subjects had a higher slope compared to those of the young subjects. This can be interpreted as a mixing of vowels that is occurring for younger speakers of BP, which is restricted to the case of verbal morphology. Our result support the importance of fine phonetic detail in perception of on-going sound change.

