

Academy of Aphasia 2011

Voicing and Tension: When one Phonetic Parameter Compensates for the Dysfunction of Another: A Case Study of an Anarthric Catalan Native Speaker

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Introduction

It is generally assumed that even if aphasic patients make use of palliative strategies to compensate for their speech production deficit, the speech therapist may be unable to find out the articulatory intention of the patient (Archambault and Bergeron, 1990) and determine whether the segment was correctly selected at the phonological (pre-motor) level of speech processing (McNeilage, 1982). However, the very same palliative strategies can be brought into light thanks to a fine-grained acoustic analysis (Baqué, 2004).

Methods

In order to assess the treatment of voicing by a Catalan native speaker with anarthria (AB), we elaborated a corpus of 300 words containing plosives and fricatives (/p t k/, /b d g/, /f s Š/, /z Ž/) in all the phonotactic positions and stress combinations possible in Catalan (#-V, #-IV, #-rV, V-V, C-V, V-C, V-#).

Results

1. The target voiced consonants produced by the patient are often perceived as unvoiced (the difference being statistically significant), which seems to indicate a “voicing deficit”.
2. Acoustic analyses show significant differences between unvoiced target consonants and voiced target consonants perceived as unvoiced by clinicians, as to the values of acoustic parameters associated to tension. The target unvoiced consonants, both plosives and fricatives, are produced systematically with longer durations, a greater number of noise bursts and longer duration of noise bursts.
3. Acoustic analyses show a gradient distinction, statistically significant ($p = .000$), of the VOT values according to the voiced/unvoiced nature of the target phoneme in relation to its perception. Target voiced consonants are produced with a prevoicing (mean VOT value: -59.59ms), whereas target voiced consonants perceived by the speech therapist as voiceless show VOT values close to zero, and target unvoiced consonants perceived as voiceless show positive VOT mean value of 17.89ms.

Conclusions

1. The systematic differentiation between the production of consonants according to the target

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voiced/unvoiced nature of the segment suggests that the patient's deficit arises at the phonetic level of speech processing, i.e. at the level of planification and execution of articulatory gestures, while the phonological (pre-motor) encoding remains unimpaired.

2. Results seem to indicate that the patient makes use of alternative, palliative strategies to compensate for her inability to use the usual phonetic (acoustic) cues, particularly those associated with tension. The patient seems to produce voiceless consonants as systematically different from voiced consonants, even if the latter are ones perceived as unvoiced.

References

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