A longitudinal acoustic study of a phonetic disorder affecting the production of voiced stops

Voicing is considered as less salient acoustically and more complex to produce than other phonetic features, and frequently causes speech errors in disordered speech [1,2]. However, it is not straightforward to study voicing: the phonetic vs. phonological nature of the speech errors is difficult to determine precisely, and so is the characterization of some productions as voiced vs. unvoiced, especially in clinical applications [3,4]. This study aims to contribute to that question, by investigating the implementation of the voicing feature in a single-case longitudinal clinical study. The study was based on a 9-months longitudinal tracking of a 11-year-old boy showing difficulties in the production of voiced stops affecting both spoken and written language. Three recording sessions have been carried out three months apart, which included simultaneous acousting and nasometric recordings. The naming task was designed to elicit words including clusters starting with a voiced or unvoiced stop. The purpose was to regularly collect speech productions to perform repeated perceptual and acoustical analyses - including « Voice Onset Time » and nasalance measures. Additionally, over the 9-months tracking a speech therapy was conducted, with the purpose of improving the voiced/unvoiced distinction via specific exercices using proprioceptive and tactile biofeedback. In this paper, we will present the results of the perceptual and acoustical analyses, which point out to a benefical effect of the therapy – the subject showing an improvement in the production of voiced stops. Moreover, our analyses have highlighted some utterances qualified as « intermediate », meaning that their characterization as voiced vs. unvoiced could not be clearly established. VOT measures on these productions revealed a specific phonetic pattern. Furthermore, some specific acoustic phenomena will be discussed, which could result from compensatory strategies spontaneously used by the subject (nasalization, epenthesis, …). This study contributes to attest the direct benefits of using acoustic analyses in clinical practice, such as diagnosis and evaluation of therapy effectiveness. However, our results also raise the question of the use of VOT as the primary cue to distinguish between voiced and unvoiced productions in clinical context.

Keywords: voicing feature, speech therapy, acoustic, disordered speech, longitudinal tracking (Preference for poster presentation)

Bibliographie :

1) Treiman, R., Broderick, V., Tincoff, R., & Rodriguez, K. (1998). Children's phonological awareness: Confusions between phonemes that differ only in voicing. *Journal of Experimental Child Psychology*, *68*(1), 3-21.
2) Blumstein, S. E. (1973). A phonological investigation of aphasic speech. *Mouton*
3) Lisker, L., & Abramson, A. S. (1964). A cross-language study of voicing in initial stops: Acoustical measurements. *Word*, *20*(3), 384-422.
4) Auzou, P., Ozsancak, C., Morris, R. J., Jan, M., Eustache, F., & Hannequin, D. (2000). Voice onset time in aphasia, apraxia of speech and dysarthria: a review. *Clinical Linguistics & Phonetics*, *14*(2), 131-150.