The dynamics of perception and production of VOT patterns in English by Brazilian learners

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Learning L2 phonology can be characterized as a non-linear and dynamic process. Variables that are part of this complex system are fully interconnected, systems tend to stabilize for some time in attractor states and language development overtime can grow or decline in a nonlinear fashion (Port & Van Gelder, 1995). Therefore, a multitude of variables, which operate at different levels, play a crucial role in second language learning (De Bot et al, 2007).

Departing from this dynamic conception of language acquisition, we present the results of an experimental study on the perception and production of English VOT patterns by Brazilian learners. Twenty-four participants from Southern Brazil took part in the study. After taking the Oxford Placement Test (Allan, 2004), learners were divided in three different proficiency groups: proficient (6 learners), intermediate (7 learners) and basic (11 participants).

All learners sat for both a discrimination and an oral production task. The discrimination task consisted of an AxB task, in which we contrasted the three VOT patterns produced by native speakers of English: pre-voicing, short VOT and long VOT. For this test, productions of voiceless plosives were also manipulated on Praat, so that we could obtain artificial short VOT plosives: as the VOT of the plosives was reduced, the resulting manipulated consonant would have the same VOT duration as a voiced segment. These artificial voiced stops were contrasted with the three natural VOT patterns in the AxB task. Therefore, four kinds of contrasts were tested in the AxB task: natural zero VOT vs. negative VOT (6 questions), Artificial zero VOT vs. Negative VOT (6), Natural zero VOT vs. artificial zero VOT (6) and positive VOT vs. negative VOT (6). In the production test, learners were asked to read word-initial /b/, /d/, /g/ and /p/, /t/ and /k/ aloud. These target words, which were repeated twice, were presented isolated and in a carrier-sentence, in a powerpoint presentation shown on a laptop computer.

The results obtained from the AxB task indicate that learners in the three proficiency groups presented high accuracy rates in the questions contrasting zero and positive VOT, which suggests that the participants are able to discriminate aspirated from non-aspirated stops. As for the contrast between Negative and (natural) zero VOT, we have not found significant differences among the three proficiency groups. This suggests that Brazilian learners do not seem to discriminate between these two patterns because they consider them to be instances of the same category (voiced stops). However, as we consider the data obtained from the discrimination between negative and artificial zero VOT, we have found a significant difference among the three groups, as more proficient learners seem to discriminate between these patterns, suggesting that they do not consider the manipulated consonants to be instances of voiced stops. This suggests that learners may make use of other acoustic cues, besides VOT, in order to distinguish voiceless from voiced stops in English.

As for the results garnered from the production of word-initial voiceless stops, we have found that learners in higher proficiency levels tend to present higher VOT levels, even though their productions do not still match the target VOT values in English. The preliminary results obtained from this experimental study suggest that the acquisition of voicing distinctions, both in terms of perception and production, may be characterized

by a multitude of acoustic cues employed by learners, which, in their L2 developmental process, have to learn how to tune in to those cues which are mostly relevant in the language system to be acquired. The results are discussed mainly regarding the nonlinearity between the process of discriminating and producing VOT patterns, in which the link between the production and perception can be understood in terms of a common currency of exchange, the gesture (Sancier & Fowler, 1997; Goldstein & Fowler, 2003).

References:

- Allan, D. (2007). *Oxford Placement Test*. Oxford: Oxford University Press.
- Best, C. (1995). A direct realist view of cross-language speech perception. In: STRANGE, W (ed.). *Speech perception and linguistic experience: issues in cross-language research* (pp. 171-204). Timonuim, MD: York Press.
- De Bot, Kes; Lowie; W.; Verspoor, M. A (2007). A Dynamic Systems Theory approach to second language acquisition. *Bilingualism: Language and Cognition*, 10 (1) 7-21.
- Goldstein, L.; Fowler, C. (2003) Articulatory phonology: a phonology for public language use. In Meyer, A. & N. Schiller. *Phonetics and Phonology in Language Comprehension and Production: Differences and Similarities (pp. 159-207)*. New York: Mouton.
- Lisker, L.; Abramson, A. (1964). A Cross-language study of voicing in initial stops: Acoustical measurements. *Word*, 3 (20), 384-422.
- Port, R.F., & van Gelder, T. (1995). *Mind as motion: Explorations in the dynamics of cognition*. Cambridge, MA: MIT Press.
- Sancier, M. L.; Fowler, C. A. (1997). Gestural drift in a bilingual speaker of Brazilian Portuguese and English. *Journal of Phonetics*, 25, 421-436.