

Italians acquiring the timing of English plosives: gemination and VOT

Paolo Mairano¹, Tania Cerni¹, Mirjana Sokolovic-Perovic², Bene Bassetti¹

¹University of Warwick (UK), ²University of Reading (UK)

Introduction

This paper investigates the double challenge faced by Italian adult learners while acquiring the timing of English voiceless plosives. On the one hand, Italian learners have to adjust their VOT (voice onset time), which is longer in English than in Italian (cf. Vaggelou et al., 1978, Ferrero & Magno Caldognetto, 1986, Flege et al., 1995). On the other hand, they have to un-learn gemination (coming from an orthographic transfer, ruling that a double grapheme corresponds to a geminate consonant, cf. Bassetti & Atkinson, 2015).

Hypothesis: we expect Italian speakers of L2 English (a) to pronounce long and short consonants following the spelling of words (respectively double vs single grapheme), and (b) to pronounce shorter VOTs than English natives.

Question: we want to see if there is a relation between these two phenomena (a correlation, an implication, or else) that may shed light on the order of acquisition of these two timing phenomena.

Data and methodology

In order to investigate gemination and VOT adaptation in L2 English, we devised 12 target words (6 in English + 6 in Italian) with plosives at the onset of stressed non-initial syllables. For each of the three plosives /p/ /t/ /k/, we included one word in which the plosive is spelled with a single grapheme and one word in which the plosive is spelled with a double grapheme. Italian and English stimuli were phonologically and lexically as similar as possible to enhance comparability:

	<p>	<pp>	<t>	<tt>	<c>	<cc>
English	<i>propose</i> [prə'pʰəʊz]	<i>oppose</i> [ə'pʰəʊz]	<i>ataxia</i> [ə'tʰæksɪə]	<i>attacking</i> [ə'tʰækɪŋ]	<i>acute</i> [ə'kʰju:t]	<i>accuse</i> [ə'kʰju:z]
Italian	<i>propose</i> [pro'pɔze]	<i>oppose</i> [o'pɔsto]	<i>atavico</i> [a'taviko]	<i>attacchi</i> [a'tak:i]	<i>acute</i> [a'kute]	<i>accuse</i> [a'kuze]

Table 1. Target words (pronounced 3 times within a frame sentence)

We recorded 90 speakers in a read-aloud task: 30 Italian speakers of L2 English attending a high school in Rome (EFL group); 30 Italian speakers who lived in Italy until the age of (at least) 18, and who have now moved to the UK since (at least) 5 years (ESL group); 30 English native speakers as controls (ENG group). Target words were randomized and mixed with 30 distractors. Speakers read the words in a carrier sentence and repeated each 3 times. They did the task with English words first, and subsequently with Italian words (the ENG group only did the task with English words). Participants also filled in a questionnaire (age, gender, age of L2 learning, years of L2 learning, dialectal background, etc.) and an auto-evaluation form.

Measurements of the data were made through a semi-automatic manually-supervised procedure driven by a custom Praat script. In effect, despite the controlled experimental setting, the segmentation of the data posed a number of challenges (such as lenitions in Roman participants and glottalizations among English speakers). For each target consonant, we measured: (a) VOT (defined as the interval between the release of the plosive and the start of the periodic signal), (b) closure duration of the target plosive. Measures were averaged across the three repetitions.

Results

Gemination. In compliance with expectations, we found that Italian learners of English show a tendency to geminate in L2 English, although less than in their L1. On average, the closure duration of <cc> words is 1.9 times longer than <c> words for Italian participants speaking Italian, and only 1.4 times longer for Italian participants speaking L2 English. Surprisingly, the ESL and EFL groups behave in the same way, suggesting that living >5 years in the UK did not help to un-learn gemination. The native English speakers do not show any significant difference in duration between <c> and <cc> words. Figure 1 shows density plots of standardized¹ closure durations for the various groups (EFL-it = Italians in

¹ The standardization has been performed within speaker and language in the intent to normalize for differences in speech rate.

Rome speaking in Italian, ESL-it = Italian immigrants in the UK speaking in Italian, EFL-en = Italians in Rome speaking in English, ESL-en = Italian immigrants in the UK speaking in English, ENG = English native speakers).

VOT. Results of the VOT reflect those found by previous studies; within great variability, Italian learners speaking in English tend to adopt slightly longer values than in their L1, but still far from native English values. The ESL group shows slightly longer values than the EFL group ($p < 0.01$), thereby showing a better “adaptation” towards native values.

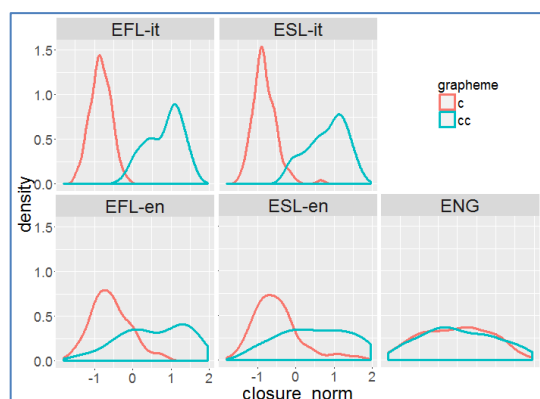


Figure 1. Standardized closure durations

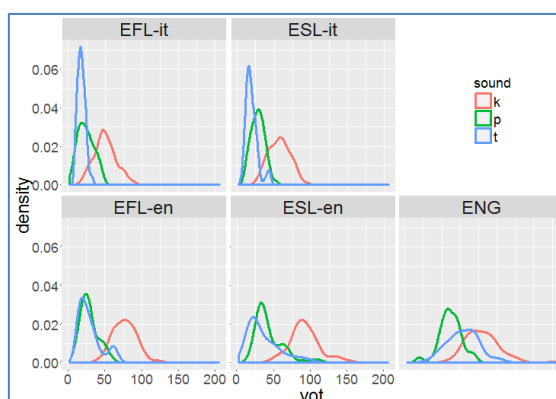


Figure 2. VOT durations in ms

Discussion

For the ESL and EFL groups we computed the gemination ratio in L2 English within every word pair (closure duration in ms of <cc> word / closure duration in ms of <c> word), and the Δ VOT (difference between VOT values in L2 English and L1 Italian) within an English word and its Italian counterpart. The gemination ratio tells us how much they lengthen <cc> consonants in English, while Δ VOT tells us how much they have adapted their VOT.

We found a moderate negative correlation between these two values ($r = 0.53$ for EFL, $r = 0.23$ for ESL), suggesting that Italians may be learning to shorten their <cc> consonants while learning to lengthen their VOT – see figure 3. Moreover, it is interesting to remark that the right-top corner of the chart (in yellow) is nearly empty: nobody has adapted their VOT to high values while still lengthening <cc> consonants. This seems to suggest an implication of these two variables: learners who have adapted their VOT have also stopped producing geminates in English (while the opposite is not true).

These results are somewhat controversial. On the one hand, VOT seems to be “adaptable” in that ESL speakers having spent >5 years in the UK do better than EFL speakers; <cc> lengthening is instead present in both ESL and EFL speakers without significant differences. On the other hand, the data also seem to show an implication by which VOT adaptation can only occur if <cc> lengthening has been un-learned; this would seem to suggest that learner first un-learn <cc> lengthening, and only then adapt VOT. More analyses are being done to understand the relationship between these two timing phenomena in the context of L2 English acquisition.

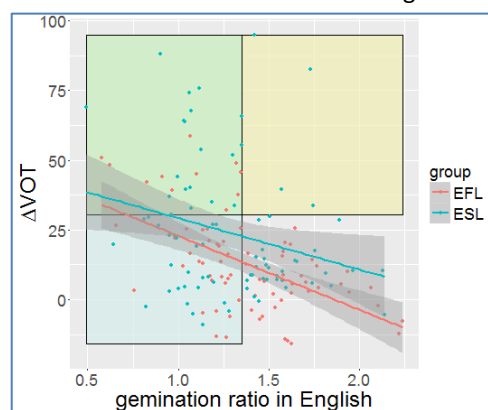


Figure 3. VOT adaptation / gemination ratio

References

- Bassetti, B. & Atkinson, N. (2015) Effects of orthographic forms on pronunciation in experienced instructed second language learners. *Applied Psycholinguistics*, 36/1, 67-91
- Ferrero, F. & Magno Caldognetto, E. (1986) Elementi di fonetica acustica, in L. Croatto (ed.) *Trattato di Foniatria e Logopedia*, Padova: La Garagnola.
- Vagges, K., Ferrero, F., Magno Caldognetto, E. & Lavagnoli, C. (1978) Some acoustic characteristics of Italian consonants, *Journal of Italian Linguistics*, 3, 69-85.
- Flege J.E., Munro, M.J. & MacKay, I.R.A. (1995) Effects of second-language learning on the production of English consonants, *Speech Communication*, 16, 1-26.