

Perception of the contrast full vowel/schwa in English by trained Spanish learners

Esther Gómez Lacabex, University of the Basque Country
M^a Luisa García Lecumberri, University of the Basque Country

1 Introduction English is a stress-timed language displaying phonological vowel reduction: weak vowels, such as schwa (/ə/), are part of the phonological form of many words in the language (mother /'mʌðə/, banana /bə'nɑ:nə/). Furthermore, English allows important weakening processes in function words (prepositions, pronouns, auxiliary verbs and conjunctions), in which peripheral vowels are often centralized to schwa. Speakers of languages such as Spanish, in which vowel lenition is only slight and not phonological, can find difficulties in perceiving and producing vowel reduction.

The study of speech learning and pronunciation instruction both in a NL (native language) and a FL (foreign language) involves the distinction between production and perception. This basic division turns out to be more complex than would be expected (Listerri, 1995). Although some of the studies propose that perception and production can be independent of each other (Paliwal et al. 1983), the existence of interrelations between the two has been widely discussed (Leather 1999, Koerich 2006). Several studies have shown that there is a facilitating relationship between perception and production since training learners in one of these abilities results in improvements in the other (Pisoni, et al 1994, Mathews 1997).

The current study looks at the effect of training on the acquisition of the English centralised unstressed vowel – schwa. It analyses the perception of the contrast full vowel/schwa achieved by a group of Spanish learners of English as a foreign language in a formal learning context after two different types of training: discriminatory or *perceptual* and articulatory or *productive* training. Therefore, we are also exploring the relationship between perception and production in order to determine whether the facilitating view between these two phenomena applies in our context.

2. Methodology The participants in this study were 41 Spanish teenagers (24 females, 17 males, mean age:15.8; see table 1 for distribution among groups) learning English as a FL in a formal context. They attended English lessons for 3 hours a week at a private language school where the training took place, in addition to English instruction at school. Their motivation towards English was measured by means of a questionnaire in which students were asked questions about their English lessons, their attitude towards the language and the usefulness of English in the future; table 1 displays the mean percentage motivation measure obtained from the questionnaire. Subjects had been studying at a private academy for 4.1 years on average. The latter was an important factor as it involved exposure to native English accents, which they did not have at school. Subjects were divided into three groups: two experimental groups (A and B) undergoing two different types of vowel reduction training (perceptual and productive) and a control group (C), which was not given any specific training. Perceptual training was based on discriminatory exercises and production on the part of the students was not encouraged. Production training, on

the other hand, provided students with articulatory cues and was based on production of the items on the part of the students and individual feedback provided by the trainer. Here, perceptual activities were avoided and sample/model productions were limited in the classroom.

	N	gender		motivation %
		male%	female%	
ABC	41	41.5	58.5	79.6%
A	17	58.8	41.2	78%
B	17	29.4	70.6	80.6%
C	7	28.6	71.4	81.2%

Table 1: distribution of subjects, gender and motivation for the three groups

Fifty five English words were selected for analysis from a corpus collected as part of a larger study. These words were minimal syllable pairs with the contrast 'full vowel' versus 'schwa' in the unstressed syllable (e.g. *bypass-compass*). They were subdivided into 25 'weak words' (those with lexical vowel reduction, i.e. *compass, fireman*) and 30 'strong words' (without lexical vowel reduction, i.e. *bypass, Superman*). The stimuli were presented and recorded by a custom-designed Matlab program. A two alternative forced-choice design with orthographic input was used in the perception test for which the stimuli were previously spliced at the syllable level. Thus, in the contrast *superman* /'su:pəmæn/ - *fireman* /'fæɪmæn/ the audio input would be either /mæn/ or /mæɪn/ with the following orthographic input to choose from: *fireman/superman*.

3. Data analysis and results Students' perceptions were coded as percentages of correct answers. A repeated measures ANOVA of the results of the combined experimental groups (A and B) with the control group in the pre and post training conditions showed that the experimental groups' performance improved after treatment in the case of weak vowel perception. Improvement of A&B proved significant for the weak vowels, $F(1,39) = 8.093$, $p < .005$, as compared to the control group (A&B: pre=49.7%, post=56.5%; C: pre=52.5% post=50.2%) but not in the case of strong vowels (A&B: pre=66.7%, post=65.6%; C: pre=63.3% post=64.7%). Although not reflected in the figures, differences between groups B and C were near significant ($p = .074^*$) in a further comparison among the three groups.

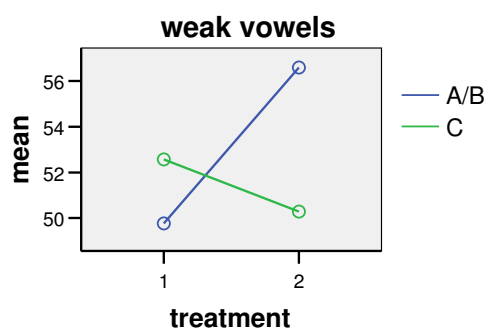


Figure 1: perception of weak vowels

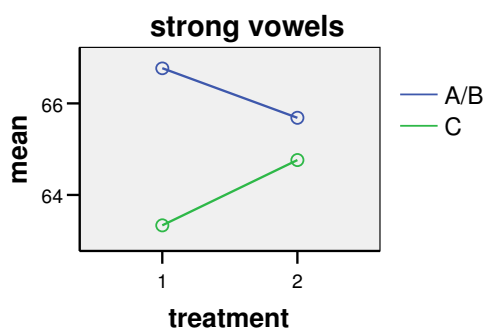


Figure 2: perception of strong vowels

Comparing the results between the two experimental groups (A and B) there were no significant differences between them in the pre-test condition for weak vowel perception while significant differences were found in the pre-test between A and B for strong vowels ($p=.035^*$). In the post-test condition, there were no significant differences between A and B in either weak vowels perception or strong vowels perception.

An analysis of pre vs. post training results for each group confirmed that they both improved after treatment for the weak vowels only (figure 3); while the improvement for group A was moderate but did not reach statistical significance ($p=.104$), group B perceived vowel reduction significantly better after the training ($p <.005$). In the case of strong vowels, neither group benefited from the treatment (figure 4). In order to explore group differences, correlation measures were carried out regarding gender and motivation; no significant correlations were found.

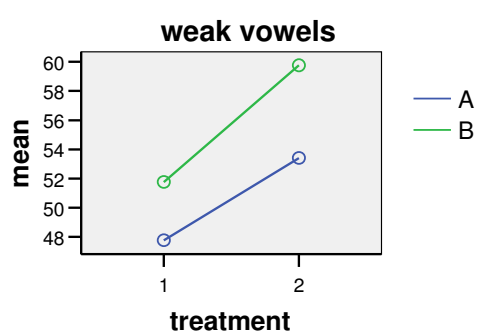


Figure 3: perception of weak vowels

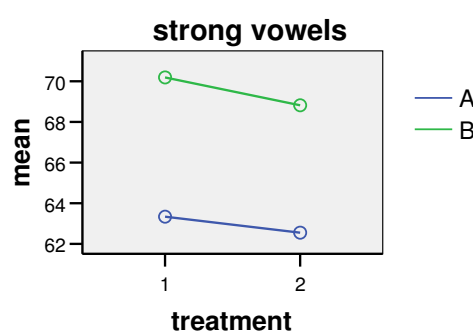


Figure 4: perception of strong vowels

4. Discussion In light of the data obtained for the experimental groups (A and B) compared to the control group we can say that the two different types of training on vowel reduction had a positive effect on the groups since perception of weak vowels showed a significant improvement for both experimental groups. A further comparison among the three groups showed that there were differences between experimental group B and the control group in the post test but these did not reach statistical significance.

Differences between the experimental groups are not significant for weak vowel perception. Bearing in mind that each group received a different type of training on vowel reduction and that they were assessed on a perception task, while good results were to be expected on the part of group A since they received training directly related to the type of task, the results for group B suggest that production training has benefitted them in the perception task. Furthermore and although not significantly, the improvement of group B is greater than that of A, as seen in figure 3. Group differences could be one of the reasons why B showed more improvement than A. Given that the groups were not different in the pre-test condition for weak vowel perception we proceeded to carry out correlation analysis for the two variables that we controlled for in this study: gender and motivation. The lack of correlation shown in this analysis suggests that these differences were not responsible for the greater improvement of group B. Therefore, our results support the facilitating view of the relationship between perception and production in the FL training context, since training students in production resulted in even more perceptual improvement than perception training.

In the case of the perception of strong vowels, we can also see a clear difference in performance: while weak vowels were better identified after the treatment, this was not the case for the strong ones as neither of the experimental groups' outscored their pre-test results. Although the perception of strong vowel sounds does not deteriorate significantly, these data could be explained in light of the effect that novel sound training can have on already acquired sounds (Mayor 1987): perception of already acquired sounds (in our case strong vowels) could be influenced by the perception training of the novel sound (weak vowel) as it is overapplied. Here, we might say that in the post-test, students hear some strong sounds as weak but which they initially judged correctly as strong.

5. Conclusions This study supports learners' capability to develop new L2 phonemic categories at the perceptual level in a formal learning context after specific training. It has also explored the difference between perception and production using training as a variable, showing that perceptual development is not only connected with specific perceptual training but that production training also has a positive effect on developing perception of L2 phonemic categories. Thus, it supports the facilitating view between these two areas which has been mentioned in the literature. Further research on students' perception of vowel reduction as well as their production performance will allow us to gain a better understanding of the two research questions addressed in this paper, namely acquisition of a new phenomenon and the relationship between perception and production.

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