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Propuestas en fonética experimental: enfoques metodológicos y nuevas tecnologías

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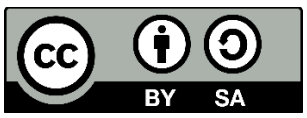

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DOES METALINGUISTIC KNOWLEDGE ABOUT THE L2 ENHANCE THE EFFECTIVENESS OF L2 PERCEPTUAL TRAINING?

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ABSTRACT

This paper examines the role of metalinguistic knowledge in the ability to perceive L2 vowel sounds, generalize and retain knowledge as a result of high variability phonetic training (HVPT). Native Catalan/Spanish speakers with different levels of L2 experience underwent identification (ID) or discrimination (DIS) training regimes. All participants were tested on vowel identification immediately before, after and some months after training. Perceptual improvement was observed with all trained participants, showing beneficial effects of training for learners with varying levels of L2 experience (Iverson, Pinet & Evans, 2012). However, the more experienced learners showed more improvement in the identification of vowels in non-sense words, showing that metacognitive learning may play a relevant role in L2 vowel learning.

Keywords: Metalinguistic knowledge, phonetic training, L2 vowel learning, L2 perception

1. INTRODUCTION

Experience in a second language (L2) is a pre-requisite for learning novel sounds, and the greater the exposure to the target language, the more likely it is that acquisition may take place (Flege, Munro, & MacKay, 1995). Therefore, the limited exposure to authentic input that is commonly found in a L2 instructional setting hinders learners' ability to perceive non-native sounds. In this problematic context, specialized phonetic training emerges as a potential alternative to authentic input. In particular, high variability phonetic training (HVPT), that is, perceptual training involving multiple talkers and stimuli, has been found to enhance L2 learners' ability to perceive target language sounds (Logan, Lively & Pisoni, 1991; Flege, 1995; Shinohara & Iverson, 2018; Carlet & Cebrian, 2019, among many more). Besides, previous studies have provided evidence of generalization to untrained structures (new stimuli, phonetic contexts, speakers, dimensions) and of retention of knowledge beyond the training period, showing that robust learning may take place as a result of training (Logan & Pruitt, 1995).

Interestingly, a positive effect of HPVT has been identified for learners with varying levels of L2 experience (Iverson, Pinet & Evans, 2012). The authors explored whether training was equally effective for French learners of English differing in proficiency level and amount of exposure. A group of beginner learners in their home country and a group of mid-intermediate learners living in the UK underwent a vowel identification training regime and were tested on the identification, discrimination and production of 14 English vowels and diphthongs. Both groups showed a slight effect of training on discrimination ability, and improved significantly in identification and production as a result of training, indicating that amount of experience is not an underlying factor for improvement to take place.

In order to explore this issue further, this paper evaluated the performance of metalinguistically naïve learners with no prior knowledge of English phonetics (henceforth, "naïve" learners) and metalinguistically experienced learners who had been attending an English phonetics and phonology course (henceforth, "experienced" learners), in order to test the potential role of metalinguistic knowledge on the perception of L2 vowels. Moreover, this study aimed at assessing whether specialized instruction had an impact on the generalization of learning to new stimuli, and/or on the retention of L2 vowels knowledge over time.

2. METHODS

This paper reports and contrasts the results of two different studies. A few methodological aspects that are shared by the two studies are explained first, followed by individual sections explaining the peculiarities of each individual study.

Both studies followed a pre-test/post-test/ /delayed post-test design. The target sounds were five English vowels sounds (i.e. /æ/-/ʌ/, /ɪ/-/i/, /ɜ:/), and the stimuli consisted of CVC non-words (for testing and training) and CVC real words to test generalization to novel stimuli. Moreover, stimuli from different talkers were used for testing and training so that generalization to novel talkers was assessed along with the main effect of training.

The stimuli were produced by six speakers of Standard Southern British English (3 females, 3 males), who were recorded in a soundproof chamber at University College London. Stimuli were embedded in a carrier sentence and each word was recorded three times, with additional repetitions whenever necessary.

The testing task was a 7-alternative forced-choice identification task (ID) with no feedback. Participants were trained either with a 7-alternative forced-choice (ID) task or a categorical discrimination task (DIS). The number of trials was doubled during the ID task, so that both trained groups had the same amount of exposure to the stimuli (ID: 576 trials; DIS: 288 trials). Immediate feedback after each trial and global feedback at the end of the training sessions were provided. Training and testing were implemented with the software TP (Rauber, Rato, Kluge & Santos, 2011).

2.1. Study 1

The participants of Study 1 were sixty "meta-linguistically experienced" learners, who were second-year English majors, with current knowledge of English phonetics and phonology (Carlet, 2017). They were divided into three groups (ID, DIS, and control group (CG)). Participants underwent five 30-minute sessions of perceptual training and were tested on the identification of L2 vowels before, after and two months after training. Due to participant mortality, only 38 participants completed this very last phase: 9 controls, 17 ID trainees and 12 DIS trainees. L2 production was also tested, but it will not be reported here.

2.2. Study 2

The participants of Study 2 were forty-five "meta-linguistically naïve" learners, who were first-year English majors, with no prior knowledge of English phonetics and phonology. They were also divided into three groups (ID, DIS, CG). Participants underwent six 30-minute sessions of training and were tested on the identification of L2 vowels before, after and four months after training. L2 discrimination and production were also tested, but they will not be reported here. Some of the original participants were discarded from the study because they did not complete all the training sessions or the post-tests. The final number of participants per group was 13, 14 and 11 for the ID, DIS and control group, respectively.

3. RESULTS AND DISCUSSION

3.1. Study 1

3.1.1. L2 vowel perception and generalization effects

The percentage correct identification of non-words and real words (generalization) at pre-test and post-test, and gain scores (i.e, difference in percentage points between post-test and pre-test) for the experimental groups and the controls were calculated and are shown in Table 1.

Table 1. Percent correct identification of English vowels in non-words and real words at pre-test and post-test and gain scores per group (Study 1).

NON WORDS	CG % (SD)	DIS % (SD)	ID % (SD)
PRE-TEST	54.1 (9.9)	55.5 (6.5)	52.9 (9.5)
POST-TEST	57.8(10.2)	65.3 (9.7)	79.1 (13.3)
GAIN	3.7	9.8	26.3
REAL WORDS	**CG % (SD)**	**DIS % (SD)**	**ID % (SD)**
PRE-TEST	72.2 (11)	78.2 (9.7)	73.1 (11.2)
POST-TEST	79.5(10.3)	79.7(11.1)	88.5 (9.5)
GAIN	7.3	1.5	15.4

Since the three groups did not differ statistically at pre-test ($F(2, 51) = .37$, $p = .68$), the effect of training was analysed by comparing the amount of gain by means of a generalized linear mixed model (GLMM) with group as fixed factor. Regarding the identification of non-words, a significant main effect of group was found ($F(2, 51) = 53.29$, $p < .01$), and pairwise comparisons revealed that both experimental groups (DIS and ID) significantly outperformed the controls ($p < .01$ in both cases). Moreover, the model revealed that the ID trainees significantly outperformed the DIS trainees ($p < .01$). These results suggest that even

though both training methods (ID and DIS) are efficient when training L2 vowels, the ID method may be superior to the DIS method.

Regarding the identification of L2 vowel sounds embedded in real words (generalization), the GLMM results yielded a significant main effect of group, ($F(2, 51) = 9.16$, $p < .001$). Sequential Bonferroni pairwise comparisons confirmed that only the ID trainees outperformed the CG, $p < .05$. Moreover, the ID group outperformed the DIS group, indicating that generalization to L2 vowels embedded in real words only occurred after receiving identification training ($p < .01$). This result confirms the robustness of an ID training method when training L2 vowels (Logan & Pruitt, 1995).

3.1.2 Retention results

Two months after the completion of the training regime, a total of 38 out of the 60 original participants completed a delayed post-test. The results of the three groups at this time were numerically higher than or similar to the post-test results. Analyses with test time as a fixed effect (pre-test, post-test, delayed post-test) for the control group revealed no significant effect of time ($F(2, 48) = 1.84$, $p > .05$), confirming that the controls performed similarly across all three testing times. Regarding the experimental groups, results in each case yielded a significant effect of time (ID: $F(2, 48) = 51.35$, $p < .01$; DIS: $F(2, 33) = 7.62$, $p < .01$). Importantly, pairwise comparisons confirmed that the performance at pre-test significantly differed from the performance at post-test and delayed post-test ($p < .001$ in both cases). Moreover, the results of the delayed post-test did not differ from the results of the post-test, indicating that the L2 vowel learning acquired through HVPT training was retained over a period of two months.

3.2. Study 2

3.2.1. L2 vowel perception and generalization effects

The percent correct identification for the three groups in Study 2 at pre-test and post-test are given in Table 2. The pattern of results is very similar to the one observed in Study 1 in that the group that seemed to have the greatest improvement was the ID group. However, while the overall scores are similar across stimulus type in Study 2, the identification scores for real words were higher than for non-words for the experienced learners in Study 1.

In the same fashion as in Study 1, a GLMM was conducted on the amount of gain (difference in percent points between post-test and pre-test scores) with group as the fixed factor. There was a significant effect of group both in the case of non-word stimuli ($F(2, 37) = 6.57$, $p = .004$) and real word stimuli ($F(2, 37) = 4.55$, $p = .017$). In both cases, post-hoc comparisons showed that the ID group outperformed the DIS and the control group. Separate statistical analyses revealed that ID and DIS's score at post-test were significantly higher than at pre-test both for non-words and for real words. The difference was not significant for the untrained controls in the case of the non-words, but they also showed significant improvement with real words, which may be the result of general exposure to English in the course of the duration of the training regime. Nevertheless, the greatest improvement was obtained by the ID group in all conditions.

Table 2. Percent correct identification of English vowels in non-words and real words at pre-test and post-test and gain scores per group (Study 2).

NON WORDS	CG % (SD)	DIS % (SD)	ID % (SD)
PRE-TEST	55.1 (14)	50 (10)	53.6 (13)
POST-TEST	57.5 (13)	59 (15)	69.9 (9)
GAIN	2.4	9	16.3
REAL WORDS	**CG % (SD)**	**DIS % (SD)**	**ID % (SD)**
PRE-TEST	56.2 (19)	56.7 (10)	55.6 (9)
POST-TEST	66.5 (12)	65.1 (16)	78.3 (11)
GAIN	10.2	9.4	22.6

3.2.2 Retention results

As in Study 1, retention of knowledge was tested with a delayed post-test. In this case, however, the delayed test occurred even later, four months after training had ended (as opposed to two months later in Study 1). Ten participants did not complete the delayed test. Thus, the total number of participants at this time was 28 (10, 11, and 7 for ID, DIS and control group, respectively). The results for the pre-test, post-test and delayed test were subjected to a GLMM analysis with testing time and group as fixed factors. The results for the trained groups did not differ significantly from the post-test results and differed from the pre-test results. Thus, despite the long interval since the post-test, the improvement observed from pre- to post-test was maintained four months later.

3.3. Assessing metalinguistic knowledge

In order to compare the results of the two studies, a GLMM analysis was conducted on the gain scores

obtained in the identification of L2 vowels for the trained groups in both studies (ID and DIS "naïve" and "experienced" groups). In the case of the non-words, the statistical analysis yielded a significant effect of group ($F(3,61) = 15.08$, $p = .000$). As can be observed in Figure 1, the ID groups obtained better results than the DIS groups and the more experienced ID trainees outperformed all the other groups. This result suggests that identification training may be the most efficient training regime for L2 vowel learning particularly when combined with metalinguistic knowledge.

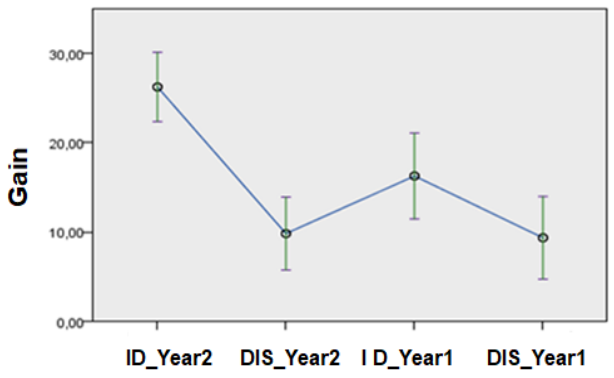

Figure 1. Gain scores of L2 vowel identification in non-words by naïve (year 1) and experienced (year 2) learners.

Regarding generalization to real words (see Fig. 2), the statistical analysis also revealed a significant effect of group ($F(3,61) = 10.82$ $p = .000$). However, despite the numerical differences, the two ID groups did not differ significantly. The same was true for the two DIS groups, showing that experience did not play a role when identifying real word stimuli. The group differences here are connected to the fact that generalization to real words took place for the ID trained groups only, showing again a greater effect with ID training compared to DIS training.

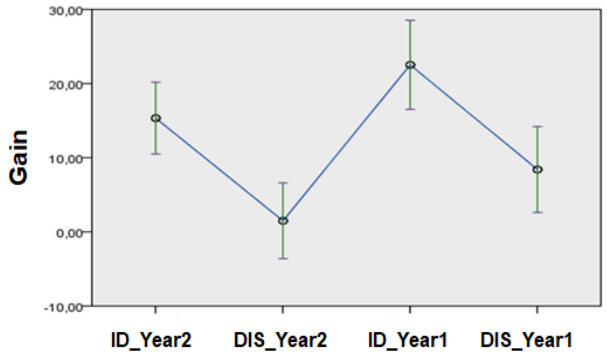

Figure 2. Gain scores of L2 vowel identification in real words by naïve (year 1) and experienced (year 2) learners.

4. GENERAL DISCUSSION AND CONCLUSIONS

This paper investigated the relationship between learners' metalinguistic knowledge and the effectiveness of high variability phonetic training (HVPT). The results of two parallel studies involving L1 Spanish/Catalan learners of English were contrasted: a group of undergraduate students who had completed a course on English phonetics, which included a detailed description of the English vowel system (Study 1), and a group of students with no such metalinguistic knowledge (Study 2). Learners were trained by means of either identification (ID) or discrimination (DIS) tasks, or remained untrained (controls). In addition, the study investigated the effect of training on trained items (non-word stimuli) and untrained items (real words), and also examined retention of knowledge over time (2 and 4 months after the completion of the training regime).

The results indicate that short phonetic training regimes are effective for different levels of L2 experience, in line with Iverson et al. (2012). However, the comparison of the two populations (Study 1 and Study 2) suggests that HVPT may work best when combined with the metalinguistic knowledge acquired during English phonetics instruction, as the group that showed the greatest improvement was one of the "metalinguistically experienced" groups. Regarding the type of training task, the ID trainees improved the most, and were able to generalize the knowledge to real word stimuli to a greater extent. Thus, ID training proved to be overall more beneficial for training L2 vowels than DIS training. This advantage may be accounted for by an effect of task familiarity, as the ID group was trained and tested with the same type of task (although the stimuli and talkers were different). Still, similar studies on consonant perception have reported comparable improvements for ID and DIS groups (Carlet, 2017; Flege 1995; Nozawa, 2015), suggesting that different tasks may be more suited for training different types of segments. Importantly, the fact that retention of knowledge was found for all trained groups, two and four months after training had ended, together with the evidence of generalization of learning (to new stimuli and new voices) highlights the efficacy of the training regimes and suggests that robust learning may occur as a result of HVPT (Logan & Pruitt, 1995).

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