

PRODUCTION: THE STARTING LINK

Grisel María García Pérez¹

grisel.garcia-perez@ubc.ca

ABSTRACT: This study investigates the effects of training native speakers of Spanish in the production of English pairs of /i/-/ɪ/, /ʊ/-/u/, and /ʌ/-/ɑ/ in a regular English as a Second Language (ESL) classroom condition. The experimental design included a pretest-posttest procedure in order to compare the subject's performance before and after a three-week training period. A direct comparison between the scores on the pretest and posttest showed no significant improvement in the subjects' performance as an effect of training. A mixed design ANOVA with 1 between factor (group) and 1 within factor (time) showed no significant groupXtime interaction ($p>.05$).

KEYWORDS: production, English vowels, pronunciation, training.

INTRODUCTION

The fact that the sounds of one language are not necessarily present in another language has inspired a number of researchers to carry out studies where the perception and production of L2 sounds has been addressed (Garcia-Pérez, 2005; Wang, 2002; Flege, Mackay, and Meador, 1999; Munro, 1993; Williams, 1979). In cross-language perception, two influential models explain how foreign vowels are assimilated to native phoneme categories. These two models are the Perceptual Assimilation Model (Best, 1994); and the Speech Learning Model (Flege, 1993, 1991a, 1988, 1987, and 1981).

The Perceptual Assimilation Model (PAM) and the Speech Learning Model (SLM) state that many L2 production errors have a perceptual origin. The SLM claims that once the learners have established a category for representing a novel sound, their production of that sound will be as good as that of a native speaker of the L2, provided their phonetic categories have been accurately represented.

¹ University of British Columbia Okanagan.

Little empirical evidence exists on the relationship between perception and production. Advocates of the motor theory would say that speech perception is dependent on speech production. Furthermore, studies have proved that production can in fact precede perception in adults. (Goto, 1971, Sheldon and Strange, 1982; Liberman, et al.; 1967).

In 1989, Perlmutter carried out a study in which adult ESL learners were given language instruction with a special emphasis on pronunciation. The findings showed that the students' intelligibility improved. The findings of Perlmutter's study were corroborated in 1998, when Derwing, Munro, and Wiebe showed that long-term ESL individuals' pronunciation could improve significantly in a 12-week program emphasizing global production skills.

Other studies have assessed the effects of English language experience on non-native speakers' production and perception of English vowels (Flege, Bohn, and Jang, 1997; Ioup, 1995; Rochet, 1995). According to these studies, if adults are given sufficient native speaker input, they will be able to produce and perceive certain L2 vowels more accurately.

Most of the studies mentioned above have been carried out in sound treated rooms and the subjects have been tested in cubicles equipped with headphones and a workstation. In these studies, the stimuli have been recorded in a sound-attenuated booth, filtered and digitized with 16-bit resolution for presentation on the workstations.

The positive results in these studies led to the idea that similar procedures could be modified for use in L2 classrooms. In practice, the majority of our ESL institutions cannot provide the teachers or the students with digitized sounds and workstations to do this type of training, although it is a fact that larger colleges are provided with computer labs these days. The present study analyzes the effects of training ESL Spanish speaking students to produce contrasting novel vowel sounds /i/-/ɪ/, /ʊ/-/ʊ/, and /ʌ/-/ɑ/ in a regular ESL classroom setting.

1. METHOD

Thirty-two native speakers of Spanish (18 females and 14 males) at the intermediate proficiency level in a full-time ESL program participated in the whole study. They ranged in age from 18 to 32 with a mean age of 22. There were 21 from

Colombia, 9 from Mexico, one from Argentina, and one from Guatemala. Their length of residence in Canada ranged from 1.5 week to 19 months (only one student) at the time of initial testing, with a mean length of residence of 3 months. All subjects reported normal hearing. They started studying English at a mean age of 15. On a scale from 1 to 7, where 1 was *never* and 7 was *very often*, the subjects estimated that 62% of the time, they speak English to a native speaker of English, and 49% of the time to a non-native speaker of English².

The participants in the experimental group ranged in age from 18 to 32 with a mean age of 23. They were 11 from Colombia, 3 three from Mexico, one from Argentina, and one from Guatemala. Their length of residence in Canada was 2 weeks to 19 months, with a mean length of residence in Canada of 3.3 months at the time of initial testing. The subjects in the test group started to study English at a mean age of 16. On a scale from 1 to 7, where 1 was *never* and 7 was *very often*, the subjects estimated that 60% of the time, they speak English to a native speaker (NS) of English, and 53,4% of the time to a non-native speaker (NNS) of English.

The students in the control group ranged in age from 18 to 28 with a mean age of 21. There were 10 from Colombia and 6 from Mexico. Their length of residence in Canada was 1.5 week to 7 months, with a mean length of residence in Canada of 2.6 months at the time of initial testing. These students started to study English at a mean age of 14. On a scale from 1 to 7, where 1 was *never* and 7 was *very often*, the subjects estimated that 64% of the time, they speak English to a NS, and 44% of the time to a NNS.

Three Canadian English NSs (one male and two females) were recruited from the Department of Linguistics at Simon Fraser University. These listener-raters had grown up in Canada west of Quebec. Two of them were undergraduate students and one was a phonetically trained professor. The three of them reported normal hearing.

A pretest-posttest evaluation procedure was used in the experiment. The same test was used before and after training to evaluate changes in the subjects' performance attributable to training.

The production part of the test consisted of fifteen sentences, which the students had to read, each containing a single clause with high frequency lexical items (e.g. "The

² On this 7-point scale, number 7 was equivalent to 100%. Because the students estimated how often they spoke English to a NS or to a NNS, sometimes they circled number 7 in both questions (the sum would then be 200%). This is why the percentages representing these questions are so high.

pool is too cool” or “She seems to be extremely pleased”). Right after they read a paragraph with sentences that had the same characteristics. At the end they answered a question specifically asking them if they thought they would speak a lot of English when they went back to their countries. This provided more information related to the students’ personal motivation and served as an extemporaneous speech sample.

The teacher in the experimental group used *Training Spanish Speakers in the Perception and Production of English Vowels* (García-Pérez, 1999), a booklet specifically designed for this project. The student’s progress was evaluated through a quiz at the end of each unit. No recordings were used in the training.

The exercises varied among sessions and included articulatory awareness, listening practice (discrimination tasks), oral repetition, reading out loud, dictation, spelling awareness, and conversation practice. In all cases, the students were presented with very similar tasks to the ones included in the pre- and posttests. However, they did not practice the exact material presented in the test. All the students in the control and experimental groups attended ESL classes, 20 hours per week, and their regular program included emphasis on pronunciation.

The stimuli analyzed for production consisted of recordings elicited from each participant before and after training in a regular ESL classroom.

Another set of stimuli was drawn from three Canadian NSs. The native speakers were given the same written material provided to the students and they were asked to do exactly the same task under the same conditions, using the same recording equipment. The objective of doing recordings was very simple. These stimuli were going to be added to the stimuli provided by the students. Once both stimuli were randomized, it was expected that the raters would give very high (very good) rating scores to the native speakers. The reliability of the scores could then be accounted for.

Seven words from the 15 sentences were individually digitized. The words selected were *caught*, *boss*, *pull*, *took*, *Tim*, and *mix* were selected for the rating procedure. The criterion for selecting this sample was simple. If the raters gave good rating scores for the words representing the sounds which Spanish speakers do not have in their L1, we could predict that the production of equal sounds was going to be good.

In the pre-post tests the students had to read a paragraph onto a tape. We needed these recordings to see if there was an improvement in the global production of these vowels. Three sentences from this paragraph with lexical items containing the vowel

sounds included in the study were also digitized with the same procedure used for the words. The sentences are:

- a) She is always sick.
- b) Luke is strong.
- c) I think he is a fool.

Once the samples were all digitized and recorded onto a CD, they were processed in the Phonetics lab in the linguistics department. Using Sound Edit™ 16 V.2, we translated the audio file format (from wave to sound files). This was done to be able to use another program that would randomize the data for the listening task.

After the files were translated, we used the Audio Experiment Generator 4.0 (Munro, 1999) to set up the listening task for each of the 7 words and three sentences. For both, the comprehensibility test and the category goodness test, we used a 5-point scale. The ratings “1” (very poor) to “5” (very good) were assigned to the category goodness test, and the ratings “1” (poor) to “5” (native like) were assigned to the comprehensibility test. The Audio Stimulus Playback 4 (Munro, 1999) was then used to play each stimulus.

2. RESULTS

The results in production indicate very little improvement for the control group (0,3) and regression in the experimental group (-0,5). This was the reality in most of the cases except for the word *caught*. The word *caught* shows the highest improvement in both groups (0,5 in the control group and 0,7 in the experimental group). These results cannot be attributed to training. To begin with, the mean scores in both groups increased. Second, the English vowel sound /a/ is represented by the vowels *au* in writing, and in general, the spelling of the word is somewhat “strange” for Spanish speakers. The Spanish speakers seemed to give special attention to the grapheme-phoneme correspondence of this word, thus improving the production of the vowel /a/. Accordingly, we predict that this knowledge could be transferred to the production of the words *taught*, *bought*, *ought*, etc.

A direct comparison between groups reveals no improvement between Time 1 and Time 2 as an effect of training. However, we carried out a statistical analysis to prove the previous statement.

On the production tests, we did 6 ANOVAS for the analysis of the words and 3 ANOVAS for the analysis of the sentences. We created two families of tests using a Bonferroni adjustment to determine the appropriate p values.

For the words we divided 0,05 (which is the p value generally thought as significant) between the number of words (6 words) and this resulted in a p value of 0,008. For the sentences we divided 0,05 between the number of sentences (3 sentences) and the result was a p value of 0.017.

The ANOVA designs had one between factor (group: experimental and control) and one within factor (time: before and after). Each ANOVA gives three different F -ratios. In this analysis one F -ratio indicates the effect of group, another one indicates the effect of time and the last one indicates the interaction of group and time. Tables 1 and 2 summarize the results for the words *caught*, *boss*, *pull*, *took*, *mix*, and *Tim* and for the three sentences included in the comprehensibility test.

Words	Group		Time		Interaction	
	F -ratio	p -value	F -ratio	p -value	F -ratio	p -value
CAUGHT	2.635	.1150	8.821	.0058	.583	.4510
boss	.148	.7032	.049	.8268	.265	.6103
pull	.064	.8025	.357	.5546	.357	.5546
took	.038	.8461	4.640	.0394	.321	.5750
mix	7.103	.0123	1.616	.2134	3.860	.0588
Tim	6.809	.0140	1.668	.2063	.363	.5512

Table 1: Results on the 6 ANOVAS carried out for the words

For the word *caught*, the results showed no significant main effect of group [$F(1, 30) = 2.635, p > .05$]. However, there was a significant main effect of time [$F(1,30) = 8.821, p < .008$]. Moreover, there was not a significant main effect when group and time interacted [$F(1,30) = .583, p > .05$]. The rest of the words did not show any significant main effect.

Sentences	Group		Time		Interaction	
	<i>F</i> -ratio	<i>p</i> -value	<i>F</i> -ratio	<i>p</i> -value	<i>F</i> -ratio	<i>p</i> -value
1	2.399	.1323	.011	.9186	1.697	.2029
2	.436	.5142	8.410	.0070	.040	.8423
3	4.023	.0546	1.249	.2732	.694	.4118

Table 2: Results on the 3 ANOVAS carried out for the sentences

Again, when we compared the results of the experimental group with those of the control group in the comprehensibility test, we immediately noticed no improvement between Time 1 and Time 2. The ANOVA designs had one between factor (group: experimental and control) and one within factor (time: before and after).

For the sentence *Luke is strong*, the results showed no significant main effect of group [$F(1, 30) = .436, p > .05$]. However, there was a significant main effect of time [$F(1,30) = 8.410, p < .017$]. There was not a significant main effect when group and time interacted [$F(1,30) = .040, p > .05$]. The rest of the sentences did not show any significant main effect.

The statistical analysis corroborates that there was an improvement in the global production of vowels /v/ and /a/. The vowel /v/ should not have been a problem for the Spanish speakers, but the vowel /a/ represented by the word *strong*, was produced with better pronunciation.

CONCLUSIONS

Two tests were used to assess the students' performance before and after training: a category goodness test and a comprehensibility test. The category goodness test yielded no significant results for the experimental group in relation to the control group. So no correlation could be established between the successful perceptual learning achieved by the students in a three-week training period (Garcia-Perez, 2005) and production.

The vowel sound /a/ showed an improved performance in the production of the word *caught*. This improvement is not attributed to training as both groups showed

better performances from Time 1 to Time 2. We might assume that the correspondence between spelling and sound could have played an important part in the results of the pronunciation for this specific word. Another plausible explanation might be that the pronunciation could have been modified through experience. However, there is no evidence to back up the previous assumptions.

The results of the comprehensibility test for the sentences *She is always sick*, *Luke is strong*, and *I think he is a fool* revealed no evidence that training had influenced the students' global production of the contrasting pairs of vowels /i/-/ɪ/, /ʊ/-/ʊ/, and /ʌ/-/ɑ/. However, there was a significant improvement in the production of the sentence *Luke is strong* in both groups. We might speculate that the sound /u/ represented in this sentence by the word *Luke*, is very similar to the Spanish /u/, so the students would not have a problem pronouncing this word. As for the sound /ɑ/ represented in this sentence by the word *strong*, we have two assumptions: First, the environment where the vowel sound /ɑ/ is, could have led to an improved pronunciation of the word *strong*. The sound is preceded by the consonant sound /r/, so there is a bit of lip rounding prior to the pronunciation of the sound. Second, the vowel sound /ɑ/ achieved the highest percentage scores in the pretest for both the perception and production parts. As the SLM suggests, this is a “new” sound and it is easier for the students to create a new category. Again, these suppositions lack empirical evidence to support a possible relationship between the high scores in the perception of the vowel sound /ɑ/ and the high scores in the production of the word *strong*.

The relationship between perception and production is still very controversial. The perceptual part of this study (Garcia-Pérez, 2005) provides ample evidence that speech perception is modifiable through training. However, it fails to prove its relationship with production. Our assumption is that speech perception might be the starting link in the chain of processes involved in second language acquisition, and that production is based on this initiating link. The need to address the issue of whether there are perceptual bases for production difficulties in L2 students still exists.

When we analyze exposure to a second language, we see that sometimes people live in a foreign country but do not take advantage of exposure to the foreign language. In our study, the students estimated that during 62% of their time they spoke English to a native speaker. This was good, and we know that the school has an “English Only”

policy which the students had to follow. However, the average time the majority of the students were exposed to an English speaking environment was three months, and studies have shown that length of residence does make a difference in the accuracy of the production of foreign sounds (Bohn & Flege, 1992). If according to research most of the improvement in L2 vowel production takes place within a 2-year period (Flege, Bohn, and Jang, 1997), a correlation between length of residence and vowel production accuracy could not be established in our study. The mean length of residence of the subjects was only three months.

Individual analysis of students suggests that exposure to the language may in fact influence accuracy in the production of English vowels. The student who improved the most in the perception and production had started studying English in Colombia at the age of 14 and, prior to coming to Canada, he had been enrolled in an intensive English program in his home country. In the extemporaneous speech sample we collected, he expressed that he was going to speak a lot of English when he went back to his country because his job (an international business company) would demand this from him.

As language instructors, we have had the opportunity to teach a second language to students who are real beginners, and have enjoyed watching the progressive improvement of these students' performance. We have noticed that changes do not take place overnight. Most of us cannot believe how well some of these students do at the end of the school year, and some of us look for the most appropriate solutions to the problems we encounter on a daily basis in our ESL classes.

This study should make ESL teachers conscious of the great difficulties the pronunciation of English vowels present to the Spanish-speaking students. Sometimes, these difficulties are underestimated by the teachers, who sometimes apt to misjudge the intellectual abilities of the students when they fail to produce certain sounds correctly, after what the teacher believes has been sufficient practice.

We hope this study will make ESL teachers gain insight into the complicated and usually unconscious reactions developed in the students' minds when they encounter foreign sounds. We also hope it will make teachers adopt a more understanding attitude towards their students' mistakes when they teach a pronunciation class. Finally, we hope that this investigation will encourage teachers to do more classroom research and look for practical ways to meet the pronunciation demands of

the students who sometimes try to assimilate more information than their minds can reasonably cope with.

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RESUMO: Este estudo investiga os efeitos do treinamento de falantes nativos do espanhol na produção do par de sons ingleses /i/-/ɪ/, /ʊ/-/u/, e /ʌ/-/ɑ/, em ambiente normal de uma sala de aula de ensino de inglês como segunda língua. O modelo experimental incluiu um procedimento pré- e pós-teste, a fim de comparar o desempenho do sujeito antes e depois de um período de três semanas de treinamento. Uma comparação direta entre os resultados do pré-teste e do pós-teste mostraram que não houve melhora significativa no desempenho dos sujeitos, como um efeito do treinamento. Um modelo misto ANOVA com 1 entre fator (grupo) e um dentro do fator (tempo) não mostrou interação grupo x tempo significativo ($p > .05$).

PALAVRAS-CHAVE: produção; vogais inglesas, pronúncia; treinamento.

ABSTRACT: This study investigates the effects of training native speakers of Spanish in the production of English pairs of /i/-/ɪ/, /ʊ/-/u/, and /ʌ/-/ɑ/ in a regular English as a Second Language (ESL) classroom condition. The experimental design included a pretest-posttest procedure in order to compare the subject's performance before and after a three-week training period. A direct comparison between the scores on the pretest and posttest showed no significant improvement in the subjects' performance as an effect of training. A mixed design ANOVA with 1 between factor (group) and 1 within factor (time) showed no significant groupXtime interaction ($p > .05$).

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