

The Effect Of Training On The Identification Of English Consonants By Arabs

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Abstract

This study addresses the issues of whether the identification of speech sounds in the process of acquiring a second language evolves independently of native segmental patterns and, secondly, whether only marked sounds and sound contrasts pose a serious problem for adult second language learners. Natural speech stimuli of English sounds were presented to two groups of Arab learners of English: (1) relatively inexperienced Arabs speakers of English and (2) experienced Arabs. Our results show that subjects with experience in English identified English sounds significantly better than those with less experience. Moreover, Arabs misidentified phonemes which have no equivalent in Arabic as often as those with equivalent counterparts in their language. Furthermore, our listeners misidentified the marked phonemes as often as the unmarked ones. We thus seem to support the claim that the more experience the non-native speakers gain in the second language, the better performance that is noted. Our findings disagree with the prediction of the Contrastive Analysis Hypothesis that Arabs would have difficulty only with /p.v. ʃ/ due to their absence from the phonemic inventory of Arabic. Our results also appear to refute the Markedness Differential Hypothesis that Arabs would find it more difficult to learn /v/ than /p, ʃ/ due the difference between these two classes of phonemes in the degree of markedness. (Research supported by Yarmouk University).

Introduction

When an adult learns a second language he often speaks with a "foreign accent". This is because he has not yet perfectly learned the sound system of the target language (L_2) and because he continues to some extent to speak in terms of his native tongue (L_1). For example, the Japanese learner often confuses English /i/ and /r/ in both perception and production. The native Spanish speaker tends to confuse English /i/ and /l/. This is because, in both cases, the two L_2 phonemes are realizations of a single L_1 phoneme. Contrastive analysts generally agree that such pronunciation errors stem from the phonological differences between L_1 and L_2 .

The assumption that a sound has been "acquired" by a second language learner has been based on observations that a learner produces that sound (Hanaia and Gradman, 1976) or on results of perception tests when the learner identifies sounds produced by native speakers of L_2 (Goto, 1971). The general claim of the contrastive analysts in apparently made on one kind of observational data, production or perception. That claim would predict that, if a perception test has been done, the production results will mirror or support the findings of the perception test, and vice versa. Generally, approaches to problems of second language learning would, then, take the following restricted form: perception precedes production. According to this belief, approaches to the problem of second language acquisition have been mainly concerned with production studies. Such approaches can be described as having one of two bases: (1) a language - specific basis and (2) a language - universal basis.

The Contrastive Analysis Hypothesis (CAH), developed by Lado (1957), is the best known theory of the language-specific type. It is essentially based on comparisons between the native and target languages, without further considerations of other languages or a theory of language in general, CAH claims that interference from the native to taught language is primarily at the abstract level of phonological or phonetic segmental features. Within the framework of this hypothesis, difficulties that face second-language learners are attributed to differences in phonemic inventories, allophonic membership in phonemic inventories, and distributional differences of phonemes between the native and the target language (Lado, 1957). Comparing Arabic and English consonant phonemes, this hypothesis would predict that /b, t, d, k, g, f, e, ʃ, s, z, ʒ, dʒ/ would cause no learning difficulty for Jordanians learning English whereas /p, v, ɣ/ would be difficult to acquire.

The second theoretical approach to problems of second language acquisition is to seek universal explanatory principles. One of the hypotheses that employ universal principles is the Markedness Differential Hypothesis (MDH) proposed by Eckman (1977). This hypothesis claims that:

The areas of difficulty that a language learner will have can be predicted on the basis of a systematic comparison of the grammars of the native language and the

markedness relations stated in universal grammar, such that,

- (a) Those areas of the target language which differ from the native language and are more marked than the native language will be difficult;
- (b) The relative degree of difficulty of the areas of the target language which are more marked than the native language will correspond to the relative degree of markedness;
- (c) Those areas of the target language which are different from the native language, but are not more marked than the native language will not be difficult.

Markedness : A phenomenon A in some language is more marked than B if the presence of A in a Language implies the presence of B; but the presence of B does **not** imply the presence of A.

(Eckman, 1977: 320-321)

Based on the implicational universal relations of Jakobson (1968) this approach, thus, would predict greater difficulties for Jordanians with English /v/ and /ʒ/ than with /p/ for two reasons: First, fricatives and nasals are more highly marked than oral stops, and second, voiced segments are more marked than voiceless ones.

These two theoretical approaches to the problem of L2 acquisition do not take into consideration that language learning is a continuous process that develops as second-language learners gain more experience in the target language. Studies relating to this issue, however, provide evidence of the effect of training in L₂ sound patterns on the evolution of speech perception or identification abilities of L₂ learners. For example, Lisker (1970) presented end-point stimuli of synthetic VOT (the relative timing of stop closure and vowel onset functioning as perceptual due to the contrast between English voiced and voiceless stops in word-initial position) continuum (VOT Values of + 10 ms and +60 ms) to native speakers of Russian. He found that the Russian subjects did not make a distinction between the "short-lag" (e.g. +10 ms) and "long-lag" (e.g. +60 ms) since this distinction is not contrastive in their mother tongue. However, conducting the experiment after several sessions of training resulted in a considerable improvement of the responses of the subjects. They assigned different category labels to the stimuli of the continuum although they did not approach the perceptual division made by native speakers of English.

Mackain, Best, and Strange (1981) reported that Japanese with relatively great experience in English as a second language showed discriminability patterns similar to those of English speakers regarding the perception of English /r/-/1/ contrast: this contrast does not exist in their native language (Price, 1981). However, inexperienced Japanese failed to show consistent responses to the same stimuli. Similarly, Strange and Dittman (1981) reported that Japanese women showed slow but steady discrimination improvement after fifteen sessions of discrimination training to identify /r/ from /1/; post-training discriminability improved dramatically as a result.

The purpose of this study is to test the claims of CAH and MDH. We also intend to test the effect of training in general on the identification of L₂ sounds by L₂ learners. For this we compare the identification of naturally produced stimuli of several English sounds, of which three do not exist in Arabic, by two groups of Arabic speakers learning English who were differentiated in their L2 experience. The actual task of the subjects was to choose between minimal pairs differing in the final consonant. Since /n-ŋ/ contrast was included in the study, other test words were chosen so as to provide word-final contrast in CVC minimal pairs to ensure uniformity of the experiment material. It is to be recalled that /ŋ/ does not exist in English word-initial position.

Methods

Test Material:

The following sixteen English test words were prepared for this study:

tap	sat	tack	safe
tab	sad	tag	save
teeth	dice	batch	sin
teethe	dies	badge	sing

A list of five tokens of each test word was prepared. Each word was typed on 3X3" cards, and the total of 80 cards were randomly shuffled for reading by a native speaker of English. The recording of five tokens of each test word was intended to increase the number of response for the purpose of statistical analysis. Moreover, the reshuffling of the cards randomly was to distract the attention of the listeners to some extent from the purpose of the study.

Recordings:

A native English speaker with self-reported normal hearing and articulation who taught an English pronunciation course at Yarmouk University in the department of

English was asked to read the 80 test words (5 tokens x 16 words) from the cards at a normal speaking tempo and with constant pitch into a microphone positioned approximately 12 inches from her mouth. She was recorded on an **Akai** tape recorder in a recording booth at the Language Laboratory of the Language Center at Yarmouk University. Five seconds interval was allowed after each test word, thus giving a session-time of 6 min. 40 seconds.

Subjects:

Two groups of native Jordanian Arabic speakers who were maximally differentiated according to their major field of study served as subjects in this study. The first group, designated as the "inexperienced" Arabs, consisted of thirty Jordanian students (mean age: 22 years) who had been enrolled in an introductory English course as a faculty requirement. Members of this group were doing undergraduate work in different fields of Arts and Humanities, except English. The "experienced" Arab group consisted of thirty students (mean age: 22 years) who were enrolled in a required English pronunciation class at sophomore level in the English department. This is a one-semester course which aims at giving students instructions and training in English articulatory phonetics. The course is based on Chapters 1-5 of **Better English Pronunciation** by O'Connor, 2nd edition, 1967. All students in this class were English majors. The members of the two groups had learned English from grades 5-12 in Jordan. All listeners had self-reported normal hearing. None of the members of either group had been to an English speaking country at the time of the study. Also, the two groups came from the same social class of Jordanian parents and graduated from public schools.

Stimuli Procedures

The recorded test words were played to the two groups. They heard the production data at a comfortable listening level through head-phones while seated in listening booths in the language laboratory. A response booklet was prepared for the eighty tokens of the test words. The instructions were read by the author in English for both groups. However, the inexperienced group was also given the instructions in Arabic. The meanings of the test words were also explained on the board to the inexperienced group to fully ensure that they understood the task. A pre-test was conducted for both groups to insure Familiarity of the test material and the language lab. Subjects were instructed to listen to a sample set of words recorded for the purpose of the pre-test warm-up and to mark their responses on the response booklet. Then, the researcher explained the task on the board and answered the subjects inquiries.

Results

Results of this study presented in Table 1 show that Jordanians encountered some difficulty in identifying consonants in word-final position in English in a forced-choice test.

Table 1: Percentage of misidentified tokens and group difference.

	Inexperienced	Experienced	difference
P	45	28	17
b	37	24	13
t	6.5	5	1.5
d	32	13	19
k	19	2	17
g	24	5	19
f	21	7	14
v	19	7	12
θ	27	2	25
ð	34.6	7	27.6
s	37	9	28
z	16.6	6	10.6
tʃ	17	5	12
dʒ	28.6	10	18.6
n	14	2	12
ŋ	68	20	48

(n = 150).

The experienced group did a rather good job identifying English consonants whereas the inexperienced listeners encountered much more difficulty in this task, as can be inferred from the following analysis:

- All consonants. The inexperienced subjects misidentified 28% of the tested consonants (668 tokens) whereas the experienced ones misidentified 10% of the same consonants (235 tokens). Wilcoxon matched-pair test on the identification difference between the two groups reached a level of significance ($p < .01$).
- Arabic-like consonants. The experienced listeners misidentified 7% of the Arabic-like consonants /b, t, d, k, g, f, θ, ð, s, z, tʃ, dʒ/. The inexperienced listeners misidentified 24% of the same phonemes. The difference of 17% between the two groups reached a level of significance by Wilcoxon matched-pair test ($p < .01$).
- Non-Arabic consonants. Overall, experienced listeners misidentified 18% of the consonants /p, v, ŋ/ whereas the inexperienced ones misidentified 43% of the tokens of the same consonants. The difference of 25% between the two groups reached a significant level by Wilcoxon matched-pair test ($p < .01$). A considerable difference was also found between the two groups for each of the three phonemes.
- Voiced vs. Voiceless consonants. The two groups could also be most clearly distinguished from each other in the number of misidentified English voiced and voiceless consonants. Thus, the inexperienced listeners misidentified the in-

tended English /p, t, k, f, e, s, tʃ/ as their cognates 24% (i.e. 16% (167 tokens) more often than the experienced ones). Also, the consonants /b, d, g, v, ʒ, z, dʒ/ were misidentified as their voiceless cognates by the inexperienced group 27% (i.e. 15% (164 tokens) more often than the other group). Wilcoxon matched-pair tests on the identification confusion show that the experienced group is significantly different from the inexperienced one in the number of misidentified voiceless obstruents ($p < .01$) and voiced ones ($p < .01$).

As for the performance of each group, it can be gathered from Table 1 above that both groups found some difficulty identifying both Arabic-like and non-Arabic phonemes. The experienced listeners misidentified 18% of the non-Arabic consonants /p, v, ʒ/ and 7% of the Arabic-like consonants /b, t, d, k, g, f, θ, ʒ, tʃ, dʒ/ whereas the inexperienced Arabs misidentified 43% of the first class and 24% of the latter. The difference between the misidentifications of these two classes of phonemes, however, reached a low level of significance for both the experienced listeners ($p < .02$) and the inexperienced ones ($p < .02$) by Mann-Whitney tests.

The voiceless bilabial stop /p/ and the voiced velar nasal stop /ŋ/ were misidentified more often than the voiced labio-dental fricative /v/ in the responses of both groups. Thus, the misidentification difference between /p/ and /v/ reached a significant level for both the experienced ($p < .01$) and the inexperienced listeners ($p < .01$). Also, the difference between /b/ and /v/ was significant for the experienced ($p < .01$) and the inexperienced groups ($p < .01$).

Discussion:

The conventional assumption in the literature of second-language acquisition that "perception precedes production" has led to the tendency for most language research to depend on production studies, since successful production is assumed to imply successful perception. Within this framework, we will discuss the results of this study in terms of the assumptions of the two theoretical approaches to problems of L_2 acquisition: The Contrastive Analysis Hypothesis and Markedness Differential Hypothesis.

In accordance with CAH, the points of contrast between L_1 and L_2 are used to predict areas of difficulty in acquisition. Thus Lado (1957) claims that difficulty at the phonemic level could result from the total absence of a segment of the second language in the learners native language. Our results, however, disagree with the prediction of CAH that Arabs would have difficulty only with /p, v, ʒ/ due to their absence from the phonemic inventory of Arabic. Our findings, however, show that both groups of listeners found some difficulty in identifying the two categories of phonemes (i.e. Arabic-like /b, t, d, k, g, f, θ, ʒ, s, tʃ, dʒ/ and non-Arabic /p, r, ʒ/ phonemes). Production data on these two categories of phonemes reported in Mitleb (1985) are closely compatible with the present data on identification. Mitleb (1985) found that native English speakers misidentified the two classes produced by Arabs almost to the same degree. Thus Lado (1957) seems to make incorrect predictions

about which elements of the target language are easy for second language learners and which are difficult for him. For our purposes, the language-specific based analysis of L_2 acquisition is less a theory than a heuristic. Clearly what is needed here is something with more explanatory power.

In an attempt to explain the results of this study, we turn to MDH which employs universal principles to predict areas of difficulty for second language learners. This hypothesis, thus, would predict greater difficulty for Jordanians with the English phonemes /ʒ/ and /v/ than with /p/ for two implicational universal reasons: First nasals and fricatives are more marked than oral stops, and second, voiced phonemes are more marked than voiceless ones. Our findings however, seem to refute this prediction. Results of the current study, thus, indicate that Jordanians misidentified /p/ and /ʒ/ more than /v/. This suggests that MDH, in its present formation, is prevented from making any adequate prediction about the acquisition of English /p/, /v/ and /ʒ/ by Arabic speakers learning English on the basis of universal principles. A recent experimental study by Mitleb (1985) has shown that Jordanians encounter the same degree of difficulty in producing both /p/ and /v/ in English.

The results of the present study appear to support the notion of learning stages. At the time the inexperienced Arab subjects were tested, their ability to identify all English consonants tested was a little above chance whereas their responses of both /p/ and /ʒ/ were only by chance. This indicates a lack of perceptual differentiation in the linguistic behavior of this group. The identification ability of the experienced listeners, on the other hand, was always significantly above chance for all consonants as were their responses for /p, v, ʒ/. Generally, listeners in this group were clearly able to identify a certain segment from its cognate better than the subjects of the inexperienced group. Thus the significant difference which was found between the two groups seems to explain the effect of training in L_2 sound system on the improvement of identification ability of L_2 learners. This is congruent with the findings of Strange and Dittman (1981) that several sessions of training improved the ability of Japanese women in identifying English /r/ from /l/. We also agree with Mackain, Best and Strange (1981) that experience in the second language is one of the decisive factors in performance: they found that two groups of Japanese learners of English with varying experience identified English /r/ from /l/ differently.

A possible interpretation of the difference found between the two groups of Jordanians is that the experienced group might have used the English temporal cues of the sound contrasts studied to identify cognates more than the inexperienced group. Since the present study dealt with the identification of naturally produced speech stimuli, we can not be sure that the English temporal cues were actually used. Identification, of course, presupposes perceptual processing, but the evidence at hand does not tell us a great deal about the underlying processes of speech perception. Such information may be partially evident in experiments where particular dimensions (such as VOT or vowel and consonant duration differences of voicing) are systematically varied. Flege (1984) found that experienced Arabs were able to use the temporal cues (vowel and consonant durational differences) which distinguish the English cognates /s/ and /z/ in word-final position significantly more than the inexpe-

rienced subjects. It is to be recalled that Arabic, unlike English, does not possess a voicing effect on vowel and consonant durations (Miteb, 1984).

Thus results of our identification test suggest that Jordanians generally encounter difficulty in identifying both English voiced (i.e. marked) and voiceless (i.e. unmarked) obstruents. Also, this study indicates that stops (i.e. unmarked) and fricatives (i.e. marked) were misidentified to the same level in the responses of the inexperienced listeners. The experienced listeners, however, misidentified stops 8% more often than fricatives as can be seen from Table 1 above. Our results, thus seem to dissupport both languages - specific and language - universal based approaches to the problem of second language acquisition, at least in the case of adults learning a second language.

Conclusions

Overall, our identification test seems to suggest that some problems emerge with current approaches to the analysis of L_2 acquisition, such as CAH and MDH. This is possibly due to the fact that these hypotheses do not acknowledge the fact that L_2 learning is a continuous process that evolves as language learners gain more experience in L_2 . Further research is clearly needed to determine the nature of experience in L_2 that is necessary to induce changes towards the norms of the target language. A tentative conclusion of this study is that hearing L_2 in naturalistic conditions may be more effective than short-term training in laboratory conditions in modifying identification ability of L_2 learners.

It should be, however, made clear that no hypothesis can be totally rejected on the basis of the data of the present study. Yet to test the current theories of L_2 acquisition, we would need data on learners' perception, identification, recognition, and production of the different aspects of L_2 phonetics and phonology under conditions when their attention is not directed so strongly to any specific feature.

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