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ABSTRACT

Major hypotheses tested in this experiment were that (a) auditory discrimination ability is influenced by the native language background of the listener and (b) auditory discrimination ability increases with maturation. The subjects were 142 English-speaking and 84 Spanish-speaking children distributed throughout the 1st, 3rd, 5th, and 7th grades. The dependent measure was a test of auditory discrimination ability consisting of taped pairs of nonsense utterances. Members of each pair were either identical or distinguishable from each other by a single sound. Analysis of variance by grade, sex, and language background was applied to the results. On the total test and on Section 1 (neutral items), there was significant variation due to grade, but not to sex or language background (all significance levels were $p<.01$). Analysis of Section 2 (English-based items) and Section 3 (Spanish-based items) showed significant variation due to grade and language background. The English-speaking children performed better than Spanish-speaking counterparts on Section 2. The reverse was true on Section 3. Results suggest that any discussion of auditory discrimination ability which does not take into account the native language background of the listener is likely to overlook a highly significant variable and lead to tenuous conclusions. (Author/LS)

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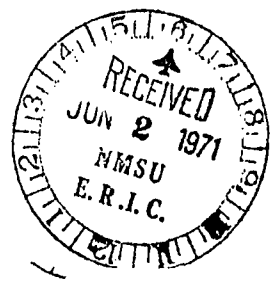


Research and Development Memorandum No. 67



# AUDITORY DISCRIMINATION PERFORMANCE OF PUPILS FROM ENGLISH- AND SPANISH-SPEAKING HOMES

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## Introductory Statement

The central mission of the Stanford Center for Research and Development in Teaching is to contribute to the improvement of teaching in American schools. Given the urgency of the times, technological developments, and advances in knowledge from the behavioral sciences about teaching and learning, the Center works on the assumption that a fundamental reformulation of the future role of the teacher will take place. The Center's mission is to specify as clearly, and on as empirical a basis as possible, the direction of that reformulation, to help shape it, to fashion and validate programs for training and retraining teachers in accordance with it, and to develop and test materials and procedures for use in these new training programs.

The Center is at work in three interrelated problem areas: (a) Heuristic Teaching, which aims at promoting self-motivated and sustained inquiry in students, emphasizes affective as well as cognitive processes, and places a high premium upon the uniqueness of each pupil, teacher, and learning situation; (b) The Environment for Teaching, which aims at making schools more flexible so that pupils, teachers, and learning materials can be brought together in ways that take account of their many differences; and (c) Teaching the Disadvantaged, which aims to determine whether more heuristically oriented teachers and more open kinds of schools can and should be developed to improve the education of those currently labelled as the poor and the disadvantaged.

The study reported in Research and Development Memorandum No. 67 discusses auditory discrimination ability with particular reference to the "disadvantaged" child whose native language or dialect is other than standard English. The experiment was conducted as a part of Teacher Training: Standard English as a Second Dialect, a project in the Teaching the Disadvantaged program.

## Abstract

The major hypotheses tested in this experiment were that (a) auditory discrimination ability is influenced by the native language background of the listener, and (b) auditory discrimination ability increases with maturation. The subjects were 142 English-speaking and 84 Spanish-speaking children distributed throughout the first, third, fifth, and seventh grades. The dependent measure was a test of auditory discrimination ability consisting of taped pairs of nonsense utterances. Members of each pair were either identical or distinguishable from one another by a single sound. On Section 1 of the test (24 items), the differences between members of a pair were based on discriminations which are neutral to speakers of English and Spanish. Section 2 (8 items) was based on discriminations which are phonemic in English but not in Spanish. Section 3 (8 items) was based on discriminations which are present in Spanish and present difficulties for speakers of English.

Analysis of variance by grade, sex, and language background was applied to the results. On the total test and on Section 1 (neutral items), there was significant variation due to grade, but not to sex or language background (all significance levels are $p < .01$). The analysis of Section 2 (English-based items) and Section 3 (Spanish-based items) showed significant variation due to grade and language background. The English-speaking children performed better than Spanish-speaking counterparts on Section 2. The reverse was true on Section 3.

The auditory discrimination "deficit" readily attributed to children of lower socioeconomic status has been viewed as a result of a noisy home environment or a scarcity of verbal stimuli. Since most tests of auditory discrimination used in the school system are based on standard English, possible differences in language or dialect backgrounds are not considered. The results of this experiment suggest that any discussion of auditory discrimination ability which does not take into account the native language background of the listener is likely to overlook a highly significant variable and lead to tenuous conclusions.

# AUDITORY DISCRIMINATION PERFORMANCE OF PUPILS FROM ENGLISH- AND SPANISH-SPEAKING HOMES[1]

Robert L. Politzer and Sheila McMahon[2]

The fact that perception and identification of speech sounds are influenced by the native language of the listener has been known for some time and has been established by the work of such researchers as Polivanov (1931-34) and Sapon and Carroll (1958). In the words of Sapon and Carroll, "The probability of perception of a given sound in a given environment is related to the language of the listener.... Where errors in perception occur, the direction and magnitude of many errors are systematically related to the language spoken by the listener..." (pp. 67-68). In other words, a native speaker of English will have relatively little difficulty differentiating, let us say, the vowels of beat [i] and bit [ɪ] and will, as a result, identify beat and bit as different words. A native speaker of Spanish, on the other hand, may have difficulty, simply because his native language does not have two i-phonemes. He may thus perceive beat and bit as identical rather than different.

Although the native language background of the speaker seems to influence the ability to differentiate between sounds, it does not

[1]The authors wish to thank the teachers and administrators of the Redwood City Elementary School District for their cooperation and assistance.

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guarantee the ability to differentiate even between phonemes of the native language. There is also some evidence that the ability to make correct sound discriminations increases with maturation (Policzer & Weiss, 1969).

Because of the well-established relationship between auditory discrimination and reading ability (see, for instance, Durrell & Murphy, 1953) and the auditory discrimination deficit that has been readily attributed to children from lower socioeconomic environments (Deutsch, 1964), a pilot study to reexamine both the developmental aspect of auditory discrimination and the influence of native-language background seemed indicated.

## Method

There are a number of different models for testing auditory discrimination. Given the heterogeneity of this sample in terms of age and language background, the simplest possible same/different paradigm was decided upon as the most efficient way of testing across a broad spectrum of age and language ability.

### Subjects

The subjects were 226 children (135 boys and 91 girls) in the first, third, fifth, and seventh grades. The first, third, and fifth graders attended a public elementary school in the Bay Area of California. The seventh graders attended a public junior high school in the same community. Eighty-four of the subjects came from Spanish-speaking (Mexican-American) home environments while 142 had an entirely English-speaking home background.

Procedure

The instrument used in the pilot study was a 40-item test. Each item consisted of a pair of either mono- or bisyllabic nonsense utterances. The pair was made up either (a) of identical utterances, or (b) of utterances differentiated only by a single sound. The task of the subjects was to decide whether the pair consisted of identical or different utterances.

The 40-item test was subdivided into three sections. In Section 1 (24 items), the differences between members of each pair were based on sound distinctions which are phonemic in French. Also included were some items where the distinctions are phonemic in both English and Spanish. Therefore, Section 1 was not biased in favor of either native speakers of English or Spanish. In Section 2 (8 items), the differences were based on phonemic distinctions in the sound system of English which are not present in the sound system of Spanish. Section 3 (8 items) contained sound differences present in the phonemic system of Spanish.

To insure an acceptable level of fidelity, the test items were recorded in the sound laboratory of the Speech and Hearing Clinic at the Stanford University Medical Center. Although the numbers preceding each item were later dubbed in both English and Spanish, the actual test items were all first-generation copies of the same master tape. The subjects heard the items of each pair one second apart. They were allowed six seconds to make their same/different discrimination and to mark their answer sheets.

The subjects were tested in groups of eight to 30, the lower grades being tested in the smaller groups. Two native speakers of English tested the English-speaking children. The Spanish-speaking children were tested by a bilingual Mexican-American.

A description of the test follows. The asterisk * indicates items in which members of the pair are identical. The difficulty index after each item is based on the ratio of correct responses to the total number of responses made for each item. Thus a difficulty index of 1.00 would mean that all subjects chose the correct response.

Section 1:

| | | | | | |
|---|---|---|---|---|---|
| 1. | matá -- matã́ | 0.88 | *13. | bœ -- bœ | 0.94 |
| 2. | rẽsé -- rɛsé | 0.24 | *14. | lyčá -- lyčá | 0.88 |
| 3. | kṍpu -- kópu | 0.25 | 15. | buré -- børé | 0.90 |
| *4. | sãp -- sãp | 0.85 | 16. | voel -- vøl | 0.43 |
| 5. | lœ̃ tí -- lœ tí | 0.72 | *17. | mẽ -- mẽ | 0.86 |
| *6. | tõkó -- tõké | 0.90 | 18. | čenkó -- čengó | 0.65 |
| 7. | ry -- rʏ | 0.78 | 19. | boldá -- boltá | 0.32 |
| 8. | píčo -- pyčo | 0.12 | 20. | gávi -- gáfi | 0.76 |
| *9. | kapé -- kapé | 0.92 | *21. | klø -- klø | 0.90 |
| 10. | tẽs -- tãs | 0.80 | 22. | pamí -- paní | 0.42 |
| 11. | lípu -- líbu | 0.51 | 23. | sápu -- sátu | 0.86 |
| 12. | míngo -- míndo | 0.62 | *24. | bãtél -- bãtél | 0.84 |

| Section 2: | | | Section 3: | | |
|---|---|---|---|---|---|
| *25. | mažɛp -- maž̌ɛp | 0.92 | 33. | saró -- saRó | 0.45 |
| 26. | bipó -- bɪpó | 0.44 | 34. | léro -- léðo | 0.57 |
| 27. | klon -- kloŋ | 0.36 | *35. | klíta -- klíta | 0.87 |
| 28. | šáeli -- č̌áeli | 0.52 | *36. | páŋxa -- páŋxa | 0.90 |
| *29. | máe bɪt -- máebɪt | 0.90 | 37. | bálma -- báRma | 0.32 |
| 30. | kápə -- kə́pə | 0.20 | 38. | tuŋxel -- tuŋkel | 0.71 |
| *31. | rəd -- rəd | 0.85 | *39. | kíRu -- kíRu | 0.91 |
| 32. | háebəl -- hébəl | 0.46 | 40. | géyes -- gwéyes | 0.85 |

The reliability of the instrument was established by computing the coefficient of reliability according to the formula Cronbach α (Cronbach, 1951).

| | |
|---|---|
| Total Test | 0.77 |
| Section 1 | 0.69 |
| Section 2 | 0.50 |
| Section 3 | 0.44 |

While the reliability of the total test seems high enough to assure that the test measures a construct that may be called "auditory discrimination ability," the reliability of the subsections, especially of Section 3, seems rather low. This fact is not really surprising. It reflects at least two circumstances: (a) the heterogeneous nature of the population used in the experiment and (b) the heterogeneous nature of the tasks which are combined in the measurement of auditory discrimination ability as envisaged by the experiment. An examination of some test

items will serve to illustrate the above points. In item 1, matá -- matã́, the difference is based on the feature of nasality which is not phonemic in either English or Spanish. In item 8, píču -- pýču, the difference is caused by lip rounding. Lip rounding is a feature of both English and Spanish but is not used in combination with front vowels as in French /y/. In item 11, lípu -- líbu, the difference results from an unvoiced/voiced distinction which occurs in both the Spanish and the English sound systems in the same way in which it is used in the test item. Thus, while items 1, 8, and 11 can be called neutral in the sense that they cannot be presumed to favor either Spanish- or English-language background, they do represent slightly different kinds of tasks.

In Sections 2 and 3 of the test, the analysis of the specific tasks is further complicated by the fact that these tasks must be interpreted differently for speakers with different language backgrounds. Item 26, bipó -- bɪpó, is based on a difference of tongue height and/or tense vs. lax articulation which corresponds to a phonemic feature of English but not of Spanish. In item 23, lero -- leðo, the difference is based on a contrast which is phonemic in Spanish as well as in English. However, the exact phonetic realization of the English contrast d/r (laddy/Larry) is not the same as in Spanish (cada/cara). Therefore it is not surprising that the heterogeneous nature of the tasks which are combined in the auditory discrimination instrument used in the experiment results in a fairly low reliability, especially in Sections 2 and 3 of the test.

Hypotheses

The purpose of this pilot study was to corroborate the findings made by other studies concerning the relationship of auditory discrimination to maturation as well as to native-language background. The main hypotheses to be tested were the following:

Hypothesis 1: The ability to make correct auditory discriminations increases with maturation.

Hypothesis 2: The ability to make correct auditory discriminations is significantly influenced by native-language background.

Hypothesis 2a: On Section 1 of the test (neutral items) no significant difference in performance will be due to either the English- or Spanish-language background of the subjects.

Hypothesis 2b: On Section 2 of the test (English-based items) subjects from English-speaking homes will perform significantly better than Spanish-speaking students.

Hypothesis 2c: On Section 3 of the test (Spanish-based items) subjects from Spanish-speaking homes will perform significantly better than subjects from English-speaking homes.

The independent variables in the experiment were the grade (age), sex, and language background of the subjects. The dependent variables were the test scores achieved on the auditory discrimination tasks.

## Results

On the basis of the independent variables (grade, sex, and language background) the subjects were divided into 16 cells. Mean scores and standard deviations of each cell on test Sections 1, 2, and 3 and on the total test are summarized in Table 1.

Analysis of variance by grade, sex, and language background was used in order to investigate the research hypotheses advanced above. This

analysis of variance was applied to the total test scores as well as to subtest scores on Section 1, 2, and 3 of the test. The results of the analysis of variance are summarized and presented in Tables 2, 3, 4, and 5. Figures 1, 2, and 3 illustrate a significant grade x language interaction observed in test Sections 1 and 2 and on the total test.

The analysis of the total test scores is, in a sense, the least interesting because the neutral, Spanish-based, and English-based items are combined in one measure. The analysis, however, does substantiate research hypothesis 1 by an overwhelmingly significant F-ratio for variance due to grade. The pattern of steady increase in test scores applies to all groups with one exception: Spanish third-graders score higher than Spanish fifth-graders. It will be noted that Spanish third-graders also outperform English third- and fifth-graders by a comfortable margin. This superior performance of Spanish third-graders combined with the superiority of English first- and seventh-graders over their Spanish counterparts accounts for the significant grade x language interaction effect shown in Table 2 and Figure 1. A great deal of care should probably be taken not to overinterpret this grade x language interaction which is also shown in Tables 3 and 4, and Figures 2 and 3. Spanish and English subjects were administered the test in different rooms so that the Spanish subjects could have the test directions given to them in Spanish. Although a great deal of care was taken to equalize testing conditions for the different grades and language backgrounds, even a slight variation can influence an auditory discrimination test. Under these circumstances the grade x language interaction is at least subject to the suspicion of reflecting some differences in testing conditions.

Table 1

Mean Scores and Standard Deviations on Auditory Discrimination Test

| | | | | Section 1 | | Section 2 | | Section 3 | | Total Test | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | N | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Grade 1 | Male | Spanish | 5 | 9.60 | (1.67) | 2.60 | (0.55) | 4.40 | (1.34) | 16.60 | (2.41) |
| | | English | 4 | 12.50 | (1.29) | 3.75 | (2.06) | 4.25 | (1.50) | 20.50 | (3.87) |
| | Female | Spanish | 4 | 8.75 | (0.96) | 2.50 | (0.58) | 4.75 | (1.50) | 16.00 | (2.16) |
| | | English | 5 | 10.80 | (2.59) | 3.80 | (0.83) | 3.40 | (0.89) | 18.00 | (2.65) |
| Grade 3 | Male | Spanish | 9 | 17.33 | (1.80) | 3.89 | (0.78) | 5.22 | (0.97) | 26.44 | (2.13) |
| | | English | 17 | 13.52 | (3.24) | 4.00 | (1.06) | 4.12 | (1.36) | 21.65 | (4.29 |
| | Female | Spanish | 9 | 17.11 | (2.89) | 3.78 | (1.09) | 5.44 | (1.33) | 26.33 | (3.28) |
| | | English | 9 | 14.56 | (1.51) | 3.22 | (0.97) | 4.44 | (1.88) | 22.22 | (2.39) |
| Grade 5 | Male | Spanish | 10 | 15.80 | (2.25) | 4.00 | (1.05) | 6.20 | (0.79) | 26.00 | (2.57) |
| | | English | 19 | 14.16 | (2.19) | 4.11 | (0.99) | 4.89 | (0.99) | 23.16 | (2.57) |
| | Female | Spanish | 3 | 15.00 | (0.00) | 3.00 | (0.00) | 4.67 | (0.58) | 22.67 | (0.58) |
| | | English | 13 | 15.69 | (2.18) | 5.15 | (1.28) | 4.85 | (0.99) | 25.67 | (3.12) |
| Grade 7 | Male | Spanish | 33 | 18.03 | (2.40) | 3.91 | (0.84) | 6.58 | (1.62) | 28.52 | (3.14) |
| | | English | 38 | 18.63 | (1.80) | 6.03 | (1.24) | 5.95 | (1.06) | 30.61 | (2.90) |
| | Female | Spanish | 11 | 16.36 | (3.17) | 3.64 | (0.92) | 7.00 | (0.89) | 27.00 | (3.69) |
| | | English | 37 | 18.46 | (2.01) | 6.43 | (1.23) | 6.05 | (1.03) | 30.95 | (3.15) |

Table 2a

Analysis of Variance: Total Auditory Discrimination Test (40 Items)

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Grade | 2387.38 | 3 | 795.79 | 81.69** |
| Sex | 10.31 | 1 | 10.31 | 1.06 |
| Language | 4.88 | 1 | 4.88 | .50 |
| Grade x Sex | 10.44 | 3 | 3.48 | .36 |
| Grade x Language | 418.19 | 3 | 139.40 | 14.31** |
| Sex x Language | 20.75 | 1 | 20.75 | 2.13 |
| Grade x Sex x Language | 47.69 | 3 | 15.90 | 1.63 |
| Error | 2045.63 | 210 | 9.74 | |

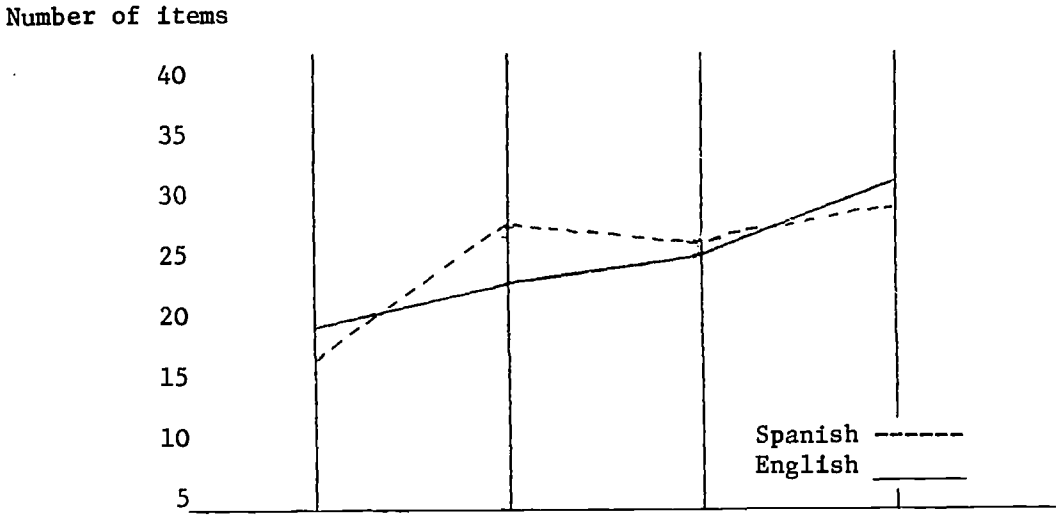
**p < .01

Table 2b

Descriptive Statistics on Total Auditory Discrimination Test (40 Items) by Grade, Sex, and Language Background

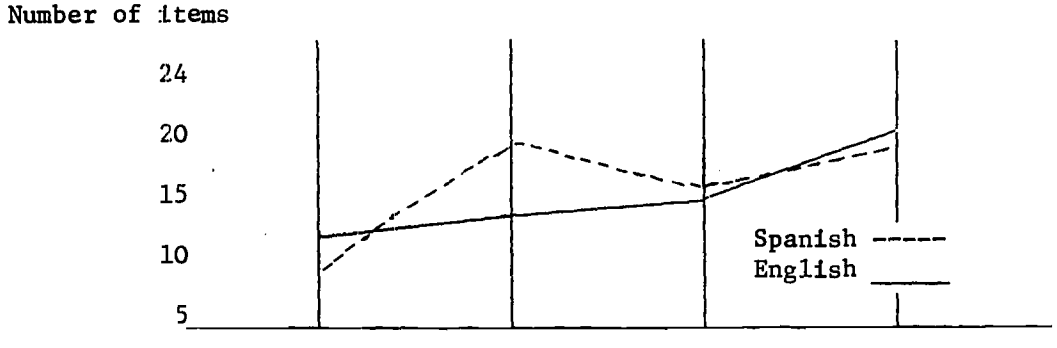
| | | | Grade 1 | Grade 3 | Grade 5 | Grade 7 |
|---|---|---|---|---|---|---|
| Spanish | Male | MS[a] | 16.60 | 26.44 | 26.00 | 28.52 |
| | | SD | 2.40 | 2.12 | 3.59 | 3.14 |
| | | N | 5 | 9 | 10 | 33 |
| | Female | MS | 16.00 | 26.33 | 22.67 | 27.00 |
| | | SD | 2.16 | 3.28 | .58 | 3.68 |
| | | N | 4 | 9 | 3 | 11 |
| English | Male | MS | 20.50 | 21.65 | 23.15 | 30.61 |
| | | SD | 3.87 | 4.29 | 2.57 | 2.90 |
| | | N | 4 | 17 | 19 | 38 |
| | Female | MS | 18.00 | 22.22 | 25.69 | 30.95 |
| | | SD | 2.64 | 2.39 | 3.12 | 3.15 |
| | | N | 5 | 9 | 13 | 37 |

[a]Mean score




| Grade | 1 | 3 | 5 | 7 |
|---|---|---|---|---|
| Spanish | 16.33 | 26.39 | 25.23 | 28.14 |
| English | 19.11 | 21.85 | 24.18 | 30.17 |

Fig. 1. Mean number of correct responses on total auditory discrimination test (40 items) by grade and language background.




| Grade | 1 | 3 | 5 | 7 |
|---|---|---|---|---|
| Spanish | 9.22 | 17.22 | 15.62 | 17.61 |
| English | 11.56 | 13.88 | 14.78 | 18.55 |

Fig. 2. Mean number of correct responses on Section 1 of auditory discrimination test (24 items) by grade and language background.

Although it is tempting to try to account for this interaction in terms of differences in maturation or motivation (test-taking behavior), such attempts would be, at best, conjectures.

Tables 3, 4, and 5 confirm the significant differences due to grade level shown in the analysis of the whole test. Table 3, the analysis of test Section 1 (neutral items), and Figure 2 show the same significant grade x language interaction observed in the analysis of the total test. The pattern is again one of superior performance of English subjects over Spanish subjects in grades 1 and 7, and superiority of Spanish third-graders over Spanish fifth-graders and English third- and fifth-graders. The interpretation of these data is subject to the cautions expressed above. The significant contribution of the analysis shown in Table 3 is the clear demonstration that language background in itself does not account for any variance in the neutral section of the test. Research hypothesis 2a is thus clearly confirmed.

Table 4 quite clearly confirms research hypothesis 2b. On the English-based section of the test, subjects from English-language backgrounds perform better than Spanish-speaking subjects. The only exception to the pattern is provided again by the third grade (female). Again, a significant grade x language interaction occurs and is illustrated in Figure 3. Research hypothesis 2c is confirmed by the analysis of Section 3 of the test in Table 5: Subjects with Spanish-language backgrounds outperform their English counterparts. The only, and evidently nonsignificant, exception is found in the female group of grade 5. Research hypothesis 2 is thus confirmed in all of its aspects: Native

Table 3a

Analysis of Variance: Section 1 of Auditory Discrimination Test (Neutral, 24 items)

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Grade | 895.26 | 3 | 298.41 | 58.70** |
| Sex | 4.00 | 1 | 4.00 | .79 |
| Language | .05 | 1 | .05 | .01 |
| Grade x Sex | 20.22 | 3 | 6.74 | 1.33 |
| Grade x Language | 172.80 | 3 | 57.60 | 11.33** |
| Sex x Language | 8.80 | 1 | 8.80 | 1.73 |
| Grade x Sex x Language | 7.24 | 3 | 2.41 | .47 |
| Error | 1067.57 | 210 | 5.08 | |

**p < .01

Table 3b

Descriptive Statistics on Section 1 of Auditory Discrimination Test (24 items) by Grade, Sex, and Language Background[a]

| | | | Grade 1 | Grade 3 | Grade 5 | Grade 7 |
|---|---|---|---|---|---|---|
| Spanish | Male | MS[a] | 9.60 | 17.33 | 15.80 | 18.03 |
| | | SD | 1.67 | 1.80 | 2.25 | 2.41 |
| | | N | 5 | 9 | 10 | 33 |
| | Female | MS | 8.75 | 17.11 | 15.00 | 16.36 |
| | | SD | .98 | 2.89 | 0.00 | 3.17 |
| | | N | 4 | 9 | 3 | 11 |
| English | Male | MS | 12.50 | 13.53 | 14.16 | 18.63 |
| | | SD | 1.29 | 3.24 | 2.19 | 1.80 |
| | | N | 4 | 17 | 19 | 38 |
| | Female | MS | 10.80 | 14.56 | 15.69 | 18.46 |
| | | SD | 2.59 | 1.50 | 2.18 | 2.01 |
| | | N | 5 | 9 | 13 | 37 |

[a]Mean score

Table 4a

Analysis of Variance: Section 2 of Auditory Discrimination Test (English-based, 8 items)

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Grade | 82.17 | 3 | 27.39 | 23.13** |
| Sex | .28 | 1 | .28 | .24 |
| Language | 41.49 | 1 | 41.49 | 35.05** |
| Grade x Sex | 1.91 | 3 | .64 | .54 |
| Grade x Language | 52.52 | 3 | 17.50 | 14.79** |
| Sex x Language | 2.40 | 1 | 2.40 | 2.03 |
| Grade x Sex x Language | 8.03 | 3 | 2.68 | 2.26 |
| Error | 248.59 | 210 | 1.18 | |

**p < .01

Table 4b

Descriptive Statistics on Section 2 of Auditory Discrimination Test (8 items) by Grade, Sex, and Language Background

| | | | Grade 1 | Grade 3 | Grade 5 | Grade 7 |
|---|---|---|---|---|---|---|
| Spanish | Male | MS[a] | 2.60 | 3.89 | 4.00 | 3.91 |
| | | SD | .55 | .78 | 1.05 | .84 |
| | | N | 5 | 9 | 10 | 33 |
| | Female | MS | 2.50 | 3.78 | 3.00 | 3.64 |
| | | SD | .58 | 1.09 | 0.00 | .92 |
| | | N | 4 | 17 | 19 | 38 |
| English | Male | MS | 3.75 | 4.00 | 4.11 | 6.02 |
| | | SD | 2.06 | 1.06 | .99 | 1.24 |
| | | N | 4 | 17 | 19 | 38 |
| | Female | MS | 3.80 | 3.22 | 5.15 | 6.43 |
| | | SD | .84 | .97 | 1.28 | 1.23 |
| | | N | 5 | 9 | 13 | 37 |

[a]Mean score

Table 5a

Analysis of Variance: Section 3 of Auditory Discrimination Test (Spanish-based, 8 items)

| Source | SS | df | MS | F |
|---|---|---|---|---|
| Grade | 123.98 | 3 | 41.33 | 27.88** |
| Sex | .50 | 1 | .50 | .34 |
| Language | 19.56 | 1 | 19.56 | 13.21** |
| Grade x Sex | 7.00 | 3 | 2.33 | 1.57 |
| Grade x Language | 1.05 | 3 | .35 | .24 |
| Sex x Language | .00 | 1 | .00 | .00 |
| Grade x Sex x Language | 6.11 | 3 | 2.04 | 1.37 |
| Error | 180.34 | 210 | .86 | |

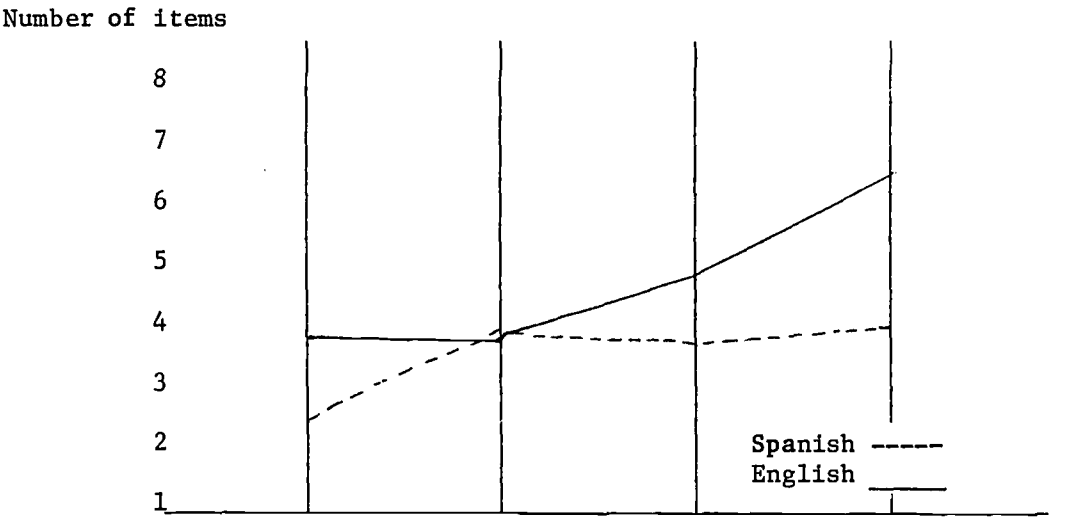
**p < .01

Table 5b

Descriptive Statistics on Section 3 of Auditory Discrimination Test (8 items) by Grade, Sex, and Language Background

| | | | Grade 1 | Grade 3 | Grade 5 | Grade 7 |
|---|---|---|---|---|---|---|
| Spanish | Male | MS[a] | 4.40 | 5.22 | 6.20 | 6.58 |
| | | SD | 1.34 | .97 | .79 | 1.62 |
| | | N | 5 | 9 | 10 | 33 |
| | Female | MS | 4.75 | 5.44 | 4.67 | 7.00 |
| | | SD | 1.50 | 1.33 | .58 | .89 |
| | | N | 4 | 9 | 3 | 11 |
| English | Male | MS | 4.25 | 4.12 | 4.89 | 5.95 |
| | | SD | 1.50 | 1.36 | .99 | 1.06 |
| | | N | 4 | 17 | 19 | 38 |
| | Female | MS | 3.40 | 4.44 | 4.85 | 6.05 |
| | | SD | .89 | 1.88 | .99 | 1.03 |
| | | N | 5 | 9 | 13 | 37 |

[a]Mean score




| Grade | 1 | 3 | 5 | 7 |
|---|---|---|---|---|
| Spanish | 2.56 | 3.84 | 3.77 | 3.84 |
| English | 3.78 | 3.73 | 4.53 | 6.22 |

Fig. 3. Mean number of correct responses on Section 2 of auditory discrimination test (8 items) by grade and language background.

language background is overwhelmingly significant in influencing the ability to make auditory discriminations.

## Discussion

Unfortunately, no comprehensive data concerning the socioeconomic background of the informal subjects were available to the experimenters. On the basis of observation and discussion with teachers and administrators, there is little doubt that by almost any type of socioeconomic classification the Spanish-speaking sample would rank lower than the English-speaking group. Almost none of the Mexican and Mexican-American families whose children took part in the experiment are employed in the

more highly paid white collar occupations. If employed, the parents are likely to be farm laborers and unskilled workers, perhaps mechanics. The subjects from English-speaking homes are typically from the lower middle class to middle class and include at least some whose families would rank fairly high on a socioeconomic scale. At any rate, it is quite clear that the difference due to language background observed in Section 2 of the test (English-based items) could quite easily be misread and misinterpreted as a difference caused by socioeconomic status.

The tests used in American schools to measure auditory discrimination ability are based on standard English. The author of the widely used Wepman Auditory Discrimination Test assures us that "every possible match of phonemes used in English was made within phonetic categories" (Wepman, 1958). This is simply another way of saying that the test is based on discrimination of sound contrasts which are phonemic in standard English. Pupils whose native language is standard English, or approaches standard English, simply have a better chance of doing well in this test than those whose native language background is a foreign language (e.g., Spanish). The handicap suffered by pupils from Spanish backgrounds in an English-based auditory discrimination test has been illustrated quite clearly in this experiment. Although not the subject of this study, the same handicap also appears to apply to pupils whose native dialect is a nonstandard form of English. Standard English contains phonemic discriminations which are simply not found in Negro dialects or in other dialects usually associated with lower socioeconomic status. An examination of the Wepman test reveals at least seven such

discriminations on each of the two forms of the test. From Politzer and Bartley (1969b), they are:

| Form I | | Form II | |
|---|---|---|---|
| #4 | leg/led | #12 | gall/goal |
| #13 | thread/shred | #14 | lit/lick |
| #17 | pat/pack | #15 | bud/bug |
| #18 | dim/din | #20 | fret/threat |
| #25 | clothe/clove | #22 | bum/bun |
| #28 | sheath/sheaf | #23 | lave/lathe |
| #33 | shoal/shawl | #36 | wreath/reef |
| #40 | pin/pen | | |

Thus, for speakers of nonstandard dialects of English, there is considerable doubt about the validity of at least 7 out of 40 of the items on each form of this test which "demonstrates" the auditory discrimination deficit presumably due to race or lower socioeconomic status. This auditory discrimination deficit has often been accounted for by various nontested hypotheses such as the noisy urban slum environment which contributes to the development of poor auditory discrimination (Deutsch, 1964). It is not the purpose of this memorandum to discuss in detail the various hypotheses which connect language development with the home environment in early childhood or to demonstrate and argue that a noisy home environment does not or cannot contribute to an auditory discrimination deficit. This study has

demonstrated, however, that any discussion of auditory discrimination should not be based on the race or socioeconomic status of the subjects alone. Any such discussion which does not take the native language or dialect background of the subjects into account is likely to overlook the really significant variable.

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