INTELLECTUAL APPRAISAL OF
MEXICAN-AMERICAN CHILDREN:
ENGLISH VS. SPANISH,
REINFORCEMENT VS. NONREINFORCEMENT

THESIS

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

MASTER OF ARTS

By

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Denton, Texas
December, 1973
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A realistic intelligence appraisal and an appropriate determination of intellectual functioning of culturally deprived, bilingual children have mushroomed into importance with the increased emphasis on equalized educational opportunities by federal and state governments (i.e. the Civil Rights Act of 1960, the national Headstart program, and the Texas Learning and/or Language Disability program). With this increased emphasis, the administration of intelligence tests for educational and emotional diagnostic purposes has become a matter of ritual since a student's qualifying for special classes and/or resource teacher guidance depends on one's IQ score. Numerous recent writings (Jensen, 1968 and 1969; Williams, 1970; Eysenck, 1971; Butcher, 1968; Tulkin, 1968) and studies (Arsenian, 1937; Davis, 1968; Spence, 1971; Hausman, 1972) have documented the fact that bilingual children from culturally deprived homes will more likely be labeled as needing special educational compensation than English speaking Anglo-American students. The
problem of eliciting the student's "true" IQ score is especially acute in South Texas, where Mexican-American bilingual enrollment constitutes the larger percentage of total enrollment in most school districts.

The current controversy over appropriate intelligence testing and interpretation began in 1869 with Francis Galton, principal founder of the scientific study of human differences (Herrnstein). Galton "... attempted to measure ... the intellectual ability of the individual, by means of certain sensory discrimination and reaction tests" (Peterson, p. 257). Finding that a high degree of innate ability tends to run as a family characteristic, he concludes that intelligence is basically inherited. Near the turn of the twentieth century, Alfred Binet, the first to make intelligence testing practical (Herrnstein) and to seek to devise ways distinctions could scientifically be made between the intellectual potential of students, reacted against the views of Galton and defined intelligence as the ability to learn (Aronson). According to Akhurst, "Binet stressed the adaptable nature of the intelligent activity enabling the individual to attain a desired end, requiring him to take up and maintain a definite direction and to be self-critical of his actions and ideas [p. 45]." Thus the nature-nurture battle of the definition and interpretation of intelligence was clearly drawn.
Others, including Stern, Thorndike, Spearman, Thurston, Terman, Cattell, Burt, and Piaget, built their theories on the foundation of inherited intelligence, intelligence as a product of one's environment, or a combination of the two. According to Russell N. Cassel (1969), these theoreticians

... tend to embrace one or both of the following concepts:

cognitive--ability to learn or manipulate objects--

"Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment" (Wechsler, 1958), and/or

adaptive--ability to adapt to his total environment--

"The degree of availability of one's experiences for the solution of immediate problems and the anticipation of future ones (Goddard, 1946), [p. 39]."

In keeping with these theories, Manfred Adler (1968) wrote that "... a great deal of a child's performance on intelligence tests depends upon his awareness of his environment [p. 366]." Charles E. Silberman (1964) states, "The nonverbal atmosphere of the home also means that lower-class children have a limited perception of the world about them: they do not know that objects have names ... or that the same object may have several names ... [p. 38]." According to Adler, "The effects that this nonverbal atmosphere would have on the many verbally loaded intelligence tests cannot be underestimated ... it is not surprising that
the lower-class child would experience great difficulty with such items as vocabulary subtests in many of our intelligence tests [p. 366]."

The issue of appropriate intelligence testing of socially disadvantaged children has become quite pointed through such outspoken writers as Robert L. Williams and Arthur R. Jensen. Williams (1970) contends that "... it is ridiculous to think of inheriting an IQ—which is nothing more than a set of scores earned on a test [p. 19]," and seeks to shift the focus to the causes rather than the results. "When we talk about individual achievement, we must look at the conditions under which students are performing. ... measured IQ in Black people is not an accurate measure of intelligence. ... [they are] penalized by the culture in which [they] live [p. 20]." Jensen (1969) agrees that socioeconomic "... differences in measured intelligence do reflect cultural differences to some degree; but they also reflect genetically-determined differences in potential for intellectual development [p. 23]."

Walter J. Cegelka and Patricia A. Thomas (1968) bring the issue into concise focus when they say, "Today there is a general recognition of the co-action influences of both heredity and environment on intelligence. The focus of much social-psychological-educational research has been on pinpointing specific cognitive processes affected by
environmental conditions. Much of this research has focused on the area of language development [p. 47]." They continue by saying "[T]hat language ability significantly influences intellectual functioning as it is measured today is apparent when one considers the heavy verbal weighting of most standardized tests. There is an evidence that not only does language ability affect verbal portions of intelligence tests, but that it also affects the ability to solve performance on non-verbal problems [p. 47]." Anastasia reports that this view seems to support that of the French physician Esquirol who, in 1858, proposed that the individual's use of language was "... the most dependable criterion of his intellectual level [p. 6]."

In response to Williams, W. V. Clemans (1970) perceives that there is confusion in "... what might be termed differences between immediate and long-term potential [p. 90]." He explained that immediate potential is the potential to perform on a given test and that long-term potential is the potential for gaining the skills to perform. Clemans makes a clear distinction between ability and achievement and insists that the measuring of one is not the same as the measuring of the other. He continues by stressing that standard English is one of the most important tools for the opening of the doors of opportunity. In fact, he believes that a truly integrated society must have a common language and refers to it as "... the cement that holds it [society] together [p. 92]."
When this vitally important development of language is deterred or retarded, IQ scores obtained through verbally loaded, culturally bound tests should yield inappropriate scores. H. T. Manuel (1935) studied 132 Mexican-American children in Texas. Each child was tested with the English version and with a Spanish translation of the Stanford-Binet. On the basis of his findings Manuel drew ten tentative conclusions which would facilitate appropriate bilingual student testing. Of this ten numbers 1, 2, 3, 4, 5, and 10 are particularly pertinent to this study.

(1) A Spanish translation of the Stanford-Binet scales would be of advantage, especially for first and second graders, in predicting achievement of Spanish speaking children, but it is inadequate when used alone.

(2) "A Spanish vocabulary test adapted to age and experience of the pupils tested would probably be of high prognostic value [p. 37]."

(3) Previous test experiences should be known.

(4) The particular language experience of these bilingual children results in a handicap which persists for an undetermined period and is difficult to evaluate in individual cases. The deficiency is more pronounced in the lower grades.

(5) The English edition of the Stanford-Binet should not be used with average Spanish-speaking
children before the third grade level without making some allowances for language difficulty.

(10) "There is every reason to believe that the removal of language and environmental handicaps would be accompanied by a significant rise in the scores of both intellectual and achievement tests [p. 38]."

Madorah Smith's 1939 study was also concerned with the effect of bilingualism in the development of language. She studied Hawaiian preschool children of non-American ancestry. The study's conclusion is that "... at the time of school entrance they [non-Caucasians] are at about the level [in language development] of three-year-old children from a less polyglot environment. The retardation is due to two handicaps: the prevalent use of pidgin English [a local hybrid language] and the bilingualism of many homes [p. 271]." She reported that due to some linguistic interference an individual cannot learn both languages equally well. The bilingual child "... will be handicapped on intelligence tests, especially on the demanding language facility [p. 135]."

With the advent and rapid popularity of the Wechsler Intelligence Scale for Children (1949) studies of its effectiveness with bilingual children have been regularly published. Grace Altus (1953) studied its utility for retarded
bilingual children of Mexican parentage. The test patterning of these bilingual children was compared with retarded unilingual children. Age, sex and performance IQ score were equated and it was found that "... [w]hile the differences in Performance IQ between the two groups had been shown to be slight and statistically insignificant, the average difference in Verbal IQ's was nearly 17 points and highly significant, favoring the unilingual group... [p. 244]." Altus pointed out the urgency of exercising great care in the interpretation of IQs which were obtained from any distinctly different group. Again (1955) Altus compared the verbal and nonverbal portions of a group administered IQ test (California Test of Mental Maturity) and an IQ test which was individually administered (Wechsler Intelligence Scale for Children). In this study, the bilinguals performed better on the group administered test on both the verbal and the nonverbal sections while the unilinguals scored better on the nonverbal portions (p. 143). The findings of Altus tend to support the theory that bilinguals evidence greater ability on tests requiring little or no verbalization.

B. M. Levinson (1959) administered a battery of IQ tests to 117 Jewish children of preschool age. He found that the Stanford-Binet (S-B) and all three Wechsler Intelligence Scale for Children (WISC) scores (verbal, performance and full scale) were higher at the .05 level of significance
for the unilingual children than for the bilingual children. In a review of research on the WISC, William Littell (1960) concludes that the literature seems to provide considerable evidence "... that the WISC cannot be applied indiscriminately to all groups without considerable revision of the interpretation of the IQ score [p. 147]."

Seemingly opposite conclusions are reported by Seth Arsenian (1937). After a study of Jews and Italians related to factors of bilingualism and socioeconomic status, he determined "... that bilingualism does not influence--favorably or unfavorably--the mental development of bilinguals of ages 9 through 14 [p. 123]." Anne Anastasia (1968) confirms this opinion when she states that there is some evidence that "... the bilingual child catches up, so that by about the age of 13 his vocabulary equals that of the monoglot [p. 259]." This is not as contradictory to the previously stated research as it may sound, for H. T. Manuel (1935) concluded in his study with the S-B, that language difficulty is less acute after the second grade.

The research by J. J. Keston and C. Jimenez (1954) presents results in direct contradiction to the studies supporting nonverbal testing or testing in the student's native language or dialect. Keston and Jimenez administered the S-B to 50 Mexican-American children in New Mexico, randomly selected, and found the English version
scores higher than the Spanish by 14 points. The authors traced this difference to the fact that the level of English language formation used by the children tested was higher than that of the Spanish language used. Because these children received their formal education in the English language, the researcher assumed that higher scores would be obtained in the language that was better developed and formally used.

Michael Palmer and Philip Gaffney (1972) gave the WISC in Spanish to 150 bilingual children and a year later administered it in English to 30 of the original sample. An analysis of variance showed no significant differences between the two testings on any of the subtest scaled scores. This result was confirmed by Loren Quay (1972) in a study in which 50 four-year-old black, severely deprived and unsocialized children were administered the S-B under two conditions, standard English and Negro dialect. The findings confirmed the earlier study indicating "... that young black children do not benefit from having the Binet administered in Negro dialect [p. 245]" as there were no differences between the groups in a comparison of item difficulty.

O. L. Davis, Jr. and C. R. Personke, Jr. (1968) bring the issue into even sharper focus in their study on the effects of administering the Metropolitan Readiness Test in English and in Spanish to Spanish-speaking school entrants in south Texas. Each subject was tested twice, at three-week intervals, during his first year of school.
"Controls of mean differences of total and subtest scores between the two modes of test administrations yielded mostly nonsignificant differences. . . That the performances of these children using both languages are, for the most part, not significant differences does not suggest that they are bilingual. Rather, the findings suggest that they have little facility in either language [p. 234]." Allyn G. Spence (1971) supports this concept with her study of language performance by children who came from homes that speak only Spanish and children who came from homes that speak English and Spanish. Both groups ". . . were disadvantaged in their knowledge of English word meaning, in their listening ability in English, and in their ability to match English words and concepts [p. 313]."

Language may not, in fact, be ". . . the crucial parameter of culture-fairness in testing Spanish-speaking children [p. 234]," contend Davis and Personke (1968). "Previous learnings, specifically the inadequacy of experiential background, are probably more important determinants of low performance than the language in which the test was administered [p. 234]." W. E. Lambert and E. Peal (1962) were dealing with the same thesis when they judged that bilingualism is an asset rather than a detriment in families of the same socio-economic class as the unilingual families they studied. H. J. Butcher (1968), supporting this view, points to the reason he believes there is a discrepancy in research
outcome on the topic. He states that the investigations which found that bilingual children were lower in IQ and verbal ability were "specious and were no longer found in better controlled studies when the bilinguals were matched with monolinguals on mental age or knowledge of English [p. 254]." Butcher contends that "the most predictive instrument for immigrants is undoubtedly the WISC Verbal, provided the children are old enough and that it is given by a tester with some familiarity with (the appropriate) speech. WISC Performance, Progressive Matrices and the non-verbal items of Terman-Merrill are less suitable . . . [p. 255]." Ralph Hausman (1972), in his exhaustive study of intellectual assessment of the South Texas Mexican-American, concluded that ". . . the English WISC Full Scale IQ appeared to be the best single predictor of the learning potential criterion [p. 63]." In an effort to prove the concept of verbal deficit in Mexican-American children, Hausman sought to show a greater correlation between English and Spanish WISC Performance IQs than English and Spanish WISC Verbal IQ correlation. His findings did not support this hypothesis.

In addition to the research of language development as a crucial factor in an appropriate determination of intellectual functioning is the study of motivation to perform at an optimal level during a testing session. Research on the effects of reinforcement on IQ scores has been
conducted in an effort to better understand the relationship between motivation and test performance. A. L. Benton (1936) was concerned about the effect of praise on children's IQ between their original score and a promise of prizes if they did better on the second test. The control group, lacking these incentives, did not differ significantly from the experimental group. N. Tiber and W. A. Kennedy (1964) studied reinforcement effects on IQ scores. They divided 480 second and third grade children into three grades: lower-class Negro, lower-class white, and middle-class white. The S-B (1960) was administered with experimental incentives given after each subtest. The researchers established four reinforcement groups: praise, reproof, candy, and no reinforcement. There were no significant differences among the groups.

Calvin V. Edlund (1972) found a different trend in his effort to determine if reinforcement would change one's IQ score. Forms L and M of the S-B were given to 79 children in his study. All subjects were given form L. Seven weeks later the experimental group was given form M with candy reinforcement after each correct response, the control group was given form M without reinforcement. "The subjects in the experimental group, with one exception, improved; the control group showed little improvement, five showing poorer scores on the second testing. The median gain for the experimental group was 12 IQ points, as compared to a median
gain of one IQ point for the control group [p. 318]." The indications of this study are that a meaningful reinforcement can be effective in raising IQ scores.

A third area of IQ testing research is the effects of language skills coupled with motivation. Efforts to determine if low IQ scores from bilingual, culturally disadvantaged children are influenced by a restricted language, low motivation, or a combination of the two factors have been studied by Quay (1971). Her study reported that 100 Negro children were administered the S-B under four combinations of standard English-Negro dialect and reinforcement—either tangible (candy) or intangible (praise). She found that in her sample "... neither the candy-reward procedure, the Negro dialect presentation, nor a combination of the two procedures facilitated performances on the Binet [p. 12]."

The foregoing overview of literature points to the confusion which exists in the study of attaining appropriate IQ scores from bilingual, culturally deprived children. Since the beginning of a scientific approach to intelligence appraisal, the issues raised have received support from contradictory views. The issues which come to the student's attention are: the nature of intelligence—heredity vs. environment; language development—bilingual vs. unilingual; and motivation—reinforcement vs. nonreinforcement.
The purposes of this study are

(1) to make a contribution to the increasingly urgent evaluation of an appropriate measure of the intellectual potential of South Texas Mexican-American children as studied through the community of Charlotte, Texas;

(2) to gain some insight into the intellectual abilities of Mexican-American children of Charlotte, Texas when compared to the national norm;

(3) to appraise the effects of bilingualism as it relates to the mental development of first through fourth grade children of Mexican-American parentage, particularly through the WISC from the standpoint of the language in which the test is given;

(4) to ascertain the value of tangible (candy) and intangible (praise) reinforcement for each correct response yielded during the testing session.

Methods

Subjects

The subjects (Ss) were 80 children of Mexican-American parentage (Spanish surnames) who were enrolled in the first through the fourth grades of the Charlotte Elementary School, Charlotte Independent School District, Charlotte, Texas. Four groups of 20 Ss were randomly selected from a
population of 178. The name of each child with a Spanish surname enrolled in the Charlotte Elementary School on January 8, 1973, was placed on a separate slip of paper and deposited in a paper sack. After each shuffling of the names, one name was drawn without replacement. As each name was drawn it was placed on one of four group lists in the following order:

1. English language — no reinforcement
2. English language — tangible and intangible reinforcement
3. Spanish language — no reinforcement
4. Spanish language — tangible and intangible reinforcement.

A written statement was obtained from each S's parents or guardians granting permission for the child to participate in the study. The possibilities of allergic reactions to chocolate candy was cleared for Ss who were to receive candy reinforcement. Since a purely random sample was sought, no controls were established for age, sex, grade distribution, or socioeconomic status.

**Instruments**

Two standardized forms of the Wechsler Intelligence Scale for Children was used:

(1) *Wechsler Intelligence Scale for Children* (Wechsler, 1949). The English WISC is the IQ
test most often used by pupil appraisal personnel. It is composed of ten basic subtests and two alternates which yield Verbal, Performance, and Full Scale IQ scores. Reliability and validity reports are recorded in the manual with the standardizing population selected from only white children of employed white males selected from a cross-section of geographic locations across the continental U. S.

(2) Escala de inteligencia Wechsler para ninos (Roca, 1970). The only standardized Spanish translation of the Wechsler Intelligence Scale for Children is Escala de inteligencia Wechsler para ninos. Translated and adapted for Spanish-speaking children in Puerto Rico, it is basically a direct translation giving exact questions, statements and instructions for the same verbal and performance subtests as the English version. The only changes made were the adaptation of certain questions which would be more familiar to the Puerto Rican children (i. e., in the Information subtest) and an item administration sequence rewording (i. e., in the Picture Completion subtest) which was based on the level of item difficulty yielded by the Puerto Rican children tested. Standardization was based on
three groups tested: group 1, \( N = 18 \); group 2, \( N = 69 \); group 3, \( N = 41 \); showing a total population of 128 subjects. The Spanish manual notes that since the Puerto Rican children in the standardization sample averaged IQ scores approximately 10 below the continental U. S. population of the same age, caution should be exercised in interpreting the Spanish WISC results.

**Examiners**

The administrator of the English language test was a trained psychometrist. The Spanish tests were administered by an adult Mexican-American resident of Charlotte, Texas, selected by the researcher, the Charlotte Elementary School principal, and the superintendent of the Charlotte Independent School District. This person was trained and tested in the appropriate administration of the Spanish WISC prior to the beginning of the test administration for use in this study.

**Procedure**

All of the testing took place during ten consecutive school days in late January, 1973. The English language and the Spanish language WISCs were administered simultaneously in separate private rooms provided by the Charlotte Elementary School. Most of the Ss were familiar with both
examiners through various types of previous contacts though this was the first association as examiner-examinee. Optimal rapport was easily and quickly established. Only the ten basic subtests were administered. Subjects were given no explanation about procedure. Those receiving the test in Spanish often asked questions about the meaning of unfamiliar words but the examiner adhered strictly to the test manual and offered no translations. Likewise, the English examiner gave no translations of unfamiliar words. Subjects who received reinforcement were given one M&M candy paired with the praise word "Good" and a smile from the examiner after each correct response. After the first reward was given, the subject was told he could either eat the candy as it was given or he could save it. All tests were scored after the final test session. The Information, Comprehension, Similarities, and Vocabulary subtests on the Spanish language tests were scored by the Mexican-American administrator. All other subtests of the Spanish WISC, the complete English WISC and all IQ scores were calculated by the researcher.

Analysis of Data

The Wechsler Intelligence Scale for Children (Wechsler, 1949) and Escala de inteligencia Wechsler para ninos (Roca, 1970) were chosen to measure the level of intellectual functioning in terms of the variable of language. The variable of reinforcement versus non-reinforcement was
used to measure the effect of motivation on intellectual functioning. Subjects were tested under one of four settings:

1. English language - no reinforcement
2. English language - reinforcement
3. Puerto Rican Spanish language - no reinforcement

A two-by-two analysis of variance was used to analyze the existing differences between the four samples. A t-test for related measures was run to determine if a significant difference was evident between the Verbal IQ scores and the Performance IQ scores of each sample group. The following null hypotheses were tested:

1. There is no significant difference in Full Scale IQ scoring tendencies of Mexican-American children of the first through fourth grades in the Charlotte Elementary School, Charlotte, Texas, when tested with the English language edition of the WISC or the Spanish language edition of the WISC.

2. There is no significant difference between the Verbal IQ scores and Performance IQ scores of Mexican-American children in the first through the fourth grades of the Charlotte Elementary School.

3. There is no significant difference in Full Scale IQ scoring tendencies of first through fourth
grade Mexican-American elementary school children in Charlotte, Texas, when tested under procedures using no reinforcement (standard testing procedures) or procedures using tangible (candy) and intangible (praise) reinforcement after each correct response.

Results

The overall purpose of this study was to compare the level of intellectual functioning of first through fourth grade Mexican-American students in the Charlotte Elementary School, Charlotte, Texas, measured under four different testing conditions. The performance of the students gave indications of more and less optimal testing conditions for identifying the Ss level of intellectual functioning. The hypotheses and their results were formulated and tested in order to explain the tendencies of the four groups.

The null hypothesis that there is no significant difference in Full Scale IQ scoring tendencies between Mexican-American bilingual students of the first, second, third, and fourth grades in the Charlotte Elementary School, Charlotte, Texas, when tested with the WISC using the English language edition or the Spanish language edition was tested. Computation in the two-by-two analysis of variance (Table 1) obtained an F value of 6.0565 between the rows which indicated a difference at the .01 significance level
in the Full Scale IQ scores of Ss tested with the English language edition and Ss tested with the Puerto Rican Spanish language edition. Children tested with the English edition of the WISC yielded a Full Scale IQ score mean of 82.1250 in contrast to a mean score of 76.1250 for children tested with the Spanish edition. This data suggests that first through fourth grade Mexican-American bilingual children in Charlotte Elementary School yield higher Full Scale IQ scores on the WISC when tested in English rather than in Puerto Rican Spanish. Thus, the researcher rejected the null hypotheses that there is no difference in the scoring tendencies of the two groups.

### TABLE 1
Summary Table for Analysis of Variance

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups (Span. vs Eng.)</td>
<td>1</td>
<td>720.0000</td>
<td>720.0000</td>
<td>6.06</td>
<td>0.02</td>
</tr>
<tr>
<td>Between Columns (Reinforcement vs Non-Reinforcement)</td>
<td>1</td>
<td>57.8000</td>
<td>57.8000</td>
<td>0.49</td>
<td>0.49</td>
</tr>
<tr>
<td>Interaction</td>
<td>1</td>
<td>414.0500</td>
<td>414.0500</td>
<td>3.48</td>
<td>0.09</td>
</tr>
<tr>
<td>Within</td>
<td>76</td>
<td>9034.9000</td>
<td>118.8803</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>79</td>
<td>10226.7500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The null hypotheses that there is no significant difference between the WISC Verbal IQ scores and Performance IQ scores of Mexican-American children in the first through the fourth grades of the Charlotte Elementary School was tested. A t-Test for related measures was calculated for each of the four test groups. To attain significance at the .001 level, a $t < 3.883$ must be found. Each test group showed a significant ($p < .001$) difference between Verbal IQ scores and Performance IQ scores.

**TABLE 2**

Verbal IQ vs Performance IQ Analysis

<table>
<thead>
<tr>
<th>Test Group</th>
<th>Verbal IQ</th>
<th>Perform. IQ</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>English/non-reinforcement</td>
<td>81.4</td>
<td>94.3</td>
<td>5.39</td>
</tr>
<tr>
<td>English/reinforcement</td>
<td>75.4</td>
<td>87.1</td>
<td>6.96</td>
</tr>
<tr>
<td>Spanish/non-reinforcement</td>
<td>68.5</td>
<td>86.2</td>
<td>5.88</td>
</tr>
<tr>
<td>Spanish/reinforcement</td>
<td>70.9</td>
<td>89.9</td>
<td>8.24</td>
</tr>
</tbody>
</table>

The null hypotheses was rejected since a significant difference was found.

The null hypotheses that there is no significant difference in Full Scale IQ scoring tendencies between first through fourth grade Mexican-American elementary school children in Charlotte, Texas, when tested under procedures using no reinforcement (standard testing procedure) or procedures using tangible (candy) and intangible (praise) reinforcement after each correct response was tested. The two-by-two analysis of variance computation (Table 1)
obtained an F value of 0.49 between the columns which indicated no significant difference in IQ testing with or without reinforcement. A difference in the performance tendencies of Ss with and without reinforcement for the English edition Ss and the Spanish edition Ss was evident. Subjects tested in English without reinforcement had a higher mean IQ (85.25) than subjects tested in English and receiving reinforcement (79.00). The opposite tendency was evident among Ss tested with the Spanish edition as those receiving no reinforcement had a lower mean IQ score (74.70) than those receiving reinforcement (77.55). The researcher retained the null hypotheses as the difference was not significant.

Though controls for age were not established, an age analysis showed that the mean Full Scale IQ scores for the groups decreased as the mean age for the groups increased.

TABLE 3
Age-IQ Correlation

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean Age</th>
<th>Mean IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>English/non-reinforcement</td>
<td>8 yr. 3 mo.</td>
<td>85.25</td>
</tr>
<tr>
<td>English/reinforcement</td>
<td>8 yr. 4 mo.</td>
<td>79.00</td>
</tr>
<tr>
<td>Spanish/reinforcement</td>
<td>8 yr. 5 mo.</td>
<td>77.55</td>
</tr>
<tr>
<td>Spanish/non-reinforcement</td>
<td>8 yr. 9 mo.</td>
<td>74.70</td>
</tr>
</tbody>
</table>

Controls for age would have made possible a more exact analysis of age-IQ correlation. The data available
indicates a tendency for high IQ scores among the young age group and a lower IQ score among the older age group. Since the tests were administered during the fifth month of the school year, the age-IQ correlation suggests that Ss with less public school experience yield Full Scale IQ scores higher than Ss with more public school experience whereas Ss 8 years 6 months and older would have one more year of school experience than those 8 years 5 months and under. It should be evident that some of the older students represent more than three and one-half completed years of school experience, as they were retained during one of the previous years due to inadequate academic achievement.

Discussion and Conclusions

The purpose of this study was to determine the testing condition under which the first, second, third, and fourth grade Mexican-American student in the Charlotte Independent School District, Charlotte, Texas, could give optimal performance on the Wechsler Intelligence Scale for Children. It is concluded by the researcher that the most appropriate measure of the intellectual potential of those students tested was the English language WISC under standardized testing conditions. This conclusion is in agreement with that of Hausman (1972), whose study focused on a similar population sample.
Since both groups of children tested with the English language WISC yielded mean Full Scale IQ scores higher than both groups tested with the Spanish language WISC, one can conclude that for the Spanish surname children in the Charlotte Elementary School, the use of Puerto Rican Spanish is not an asset. A careful examination of the Puerto Rican Spanish translation of the WISC and an observation of the mean IQ scores yielded by each group in this research, indicate that Puerto Rican Spanish is more unfamiliar to the children tested than standard English.

The evidence indicates that the Spanish-speaking child in Charlotte does not express himself adequately in either English or Puerto Rican Spanish. One can conclude from this study that the subject's abilities for verbal expression are undeveloped in comparison to the national norm. Since, as Aiken (1971) points out, "... intelligence, like almost all human characteristics is a complex product of heredity and environment, rather than the result of either factor in isolation. ... the problem becomes one of providing an optimal environment for the development of a genetic potential. Psychologists are not certain exactly what variables are essential to the development of intellectual potential, but some have stressed the importance of sensory stimulation and language training in early childhood [p. 158]."
The question seems to be, "how can a child's intellectual potential be measured in a language he does not have?" The South Texas Mexican-American child is referred to as Spanish-speaking. In actuality his language is a derivation of Castillian Spanish, a localized dialect called "Tex-Mex". "Tex-Mex" is not a written language, it is not a formally taught language. "Tex-Mex" is a home-spoken language which varies from community to community. The implications of the difficulty of standardizing an IQ measure which includes concept expression through verbalization are readily apparent.

Galvan (1967) and others propose that verbal tests of intelligence are inadequate when testing bilingual children. He based this conclusion on the correlation of Verbal IQ scores and a correlation of Performance IQ scores attained from third through fifth grade Mexican-American children from bilingual homes in Dallas, Texas who were tested with the English and Spanish editions of the WISC. In his study, there was a significantly higher correlation between the English and the Spanish Performance IQ scores than between the Verbal IQ scores.

In the current research each subject was tested only once, with either the English or the Spanish edition of the WISC. An average Performance IQ score of 89.36 for the four sample groups as contrasted to the average Verbal
IQ scores of 74.05 seems to support Galvan's conclusion. These results also add emphasis to the effects of deficient verbal skills, whether they be the results of heredity or environment, in the appropriate establishment of intellectual potential.

The effect of tangible (candy) and intangible (praise) reinforcement for each correct response yielded during the testing session appears to be insignificant for the Charlotte Elementary School sample population. Of the Ss tested in standard English a higher mean IQ score was found for those tested without conditions of reinforcement than for those tested with conditions of reinforcement. The opposite results were found among Ss tested in Puerto Rican Spanish. The difference was insignificant between Ss reinforced and non-reinforced in both languages. The researcher concluded that tangible and intangible reinforcement is not significant in increasing the Ss motivation for an optimal test performance.

The problem of appropriate measures for the intellectual appraisal of South-Texas Mexican-American elementary school students is broad and complex. Little resolution has been found in the age-old conflict over the importance of environment and heredity in the study of intelligence. A valid approach for study seems to be "both and" rather than "either or," for significant conclusions must be based
on the contributions from research in many areas--economic, cultural environment, school experiences, age, social history, and family history. As long as the student from this population is caught in the clutches of two cultures, each conveying its own thought patterns, language, and value systems the task of developing a culture-fair measure of intellectual potential is crucial. Only when such an instrument is available can those students be fairly evaluated, placed and have their intellectual needs met through the structures of today's educational system.

Recommendations

The researcher proposes the following recommendations for further study:

1. Continued research in the area of appropriate measures of intellectual potential of the bilingual, Mexican-American elementary school child in South Texas using the English language, which would include more stringent controls in the areas of
   a. age
   b. number of years of public school experience
   c. family socio-economic status.

2. The effects of practice test sessions prior to the actual test experience.
3. Experimental research in the use of English and "Tex-Mex" interchangably for the purpose of permitting the subject to express himself in whichever language he is able throughout the test session.

4. Standardization of an intelligence test in the South-Texas "Tex-Mex" which will permit verbal expression in the thought pattern style familiar to his environment.

5. Continual experimentation in classroom conditions which will provide a controlled, optimal learning environment in the public school since the home environment cannot be controlled.

6. Additional study in the area of test performance motivation, with and without the use of reinforcements.


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