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LINGUAL DEVIATION, VISUAL PERCEPTION, AND READING ACHIEVEMENT

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Progress in reading instruction depends to a great extent on perception and cognition. Perception depends upon the performance of sensory organs, quality of the circumstances attendant to the act of perception and the attitudes and predisposition of the perceiver which affect the quality of his perceptual performance.

Perceptual acuity commences during the first hours of life. Curiosity regarding the environment and the extent and depth of interaction with his environment profoundly affect the perceptual development of the individual. Language usage is a method by which interaction with the environment is achieved and curiosity is assuaged. Later language permits an individual to formulate and express emotions and ideas and in this way to acquire information about and a relationship with other people and his environment.

Oral Language

Strickland, Hildreth and Frasier stressed the importance of oral language in reading readiness and reading achievement. Sofietti advocated an instructional program in reading, spelling and writing in which there was much vocalization. He contended that it is in the vocalization of language that meaning is triggered for the individual. With regard to the importance of oral language, Lefevre recommended that learning of the graphic system should proceed by analogy to the prior learning of the spoken language. Lado concluded that learning to read and write implied that the language is known and that what is being learned is a graphic representation of that language. According to Fries, learning to read involves developing rapid recognition responses to graphic shapes. However, the relationship between the patterns of oral language underlies the understanding of the graphic patterns in reading. Fries concluded:

The process of learning to read is the process of transfer from the auditory signs for language signals which the child has already learned to the new visual signs for the same signals.

Lingual Deviation

However, when the oral language which the child speaks differs

from that which he will learn to read, the transfer from auditory to visual symbols may be hampered. Such lingual variation results partially from bilingualism and/or from the use of dialects which are deviations from standard English usage. Zintz and Noel found that parent and family lingual usage has a strong impact on the child's language and that cultural factors are a significant factor in lingual usage. McCarthy as well as Beck and Saxe concluded that the geographical location of the home and its similarity to, or difference from, those in the larger environment will have a bearing on the lingual pattern used by children. McCarthy pointed out that as the child grows and his environment expands beyond the home and family, the influence of the child's peers exerts increasing influence on the lingual patterns which he uses. She concluded that peer influence is very strong and pressure for conformity is always present. Worley and Story concluded on the basis of their research that socioeconomic status is a significant variable with regard to the level of lingual ability. Siller reached similar conclusions on the basis of his investigations, also focused on language and socioeconomic level. Templin has reported that speech development, especially with regard to sentence length and complexity, is related to socioeconomic status. He further indicated that lower-class children demonstrated less lingual development and ability than did middle or upper-class children. Deutsch found that children in lower socioeconomic groups had less capability in areas of abstraction. This could certainly influence the amount and type of language which such children have at their command. In turn, this could have an influence on their progress in developing skills in reading and language arts.

In addition to this, it is vital to explore the effect that lingual deviation may have on other modes of perception. For example, audition may be affected due to the masking of sounds which the individual does not use in his own oral language. Also, does lingual deviation affect visual and auditory discrimination?

Criteria

With regard to the criteria which should be applied in designating standard, acceptable English usage, Chomsky cautioned that "grammaticalness is only one of the many factors that interact to determine acceptability." He also pointed out the importance of recognizing the points of connection between syntax and semantics. According to Lefevre, there is a sentence pattern which is related to the function order for word groups. This word or function order in sentence patterns is most important due to the structure in American English

sentences. Lefevre also pointed to phonetics as an important criteria. Fries mentioned meaning derived from grammatical structure as a function of the signalling pattern which is inherent in language. Thus, criteria mentioned by linguists as criteria for establishing what is considered standard English usage include: grammar, syntax, vocabulary, phonetics and meaning.

Thus, there is a consensus among linguists and educators as to the importance of oral language and its role in the development of skills in reading. It is important to explore the effect of lingual variation upon reading in connection with covariates which apply such as age, sex of pupil, intelligence and socioeconomic level. It is also important to control for the influence of the interviewer on the lingual pattern used by the pupils. Love's study with French-speaking children demonstrated the significant influence which the identity of the interviewer had on the lingual pattern of pupils. Chall and Feldmann have cautioned, as a result of their research, that among the shortcomings of many studies concerning language has been the failure of the investigators to account for that very effect. In addition to the foregoing considerations, the influence of lingual usage should be explored in connection with visual perception as well as reading achievement, controlling for all of the covariates mentioned.

Because such a study appeared to merit attention, a proposal was submitted to the Research Committee of the UCLA Academic Senate for funds to support such a project. Support was granted.

The Study

Method

Permission was obtained from Santa Monica Schools for third and fourth graders in two schools to participate in the study.

Lingual Deviation

A structured interview previously used in a pilot study was used individually with pupils in order to determine the extent of lingual deviation. This structured interview utilized a check sheet which included the following criteria:

- I. Grammar:
 - 1.0 Sequence
 - 2.0 Agreement
 - 3.0 Tense

- II. Vocabulary:
 - 1.0 Transition
 - 2.0 Auxiliary

III. Pronunciation:

- 1.0 Vowel
- 2.0 Consonant
- 3.0 Initial Omission
- 4.0 Terminal Omission
- 5.0 Intonation

For the purpose of this study, sequence referred to the order of words within sentences; agreement implied the agreement in number between subject and verb; transition was used with regard to one part of speech being used for another, e.g., “cool” an adjective used as a verb means calm down; auxiliary referred to the use of auxiliary verbs. The first four areas under pronunciation were all concerned with the proper pronunciation of entire words. Each time an error was made in any of these categories the researcher indicated this using written notation on the check sheet. Intonation referred to cadence and expression used in speaking.

Visual Perception

Visual perception was explored in terms of the ability to perceive letters in series of three, six and nine and to (1) reproduce the letters and (2) determine any pattern with regard to their placement, i.e., alphabetical. Analysis was made for responses with regard to accuracy in initial, medial and terminal position. Reproduction refers to the ability to reproduce what the pupil had perceived on the exposed slide. Identification referred to the ability of the pupil to determine when alphabetic sequence was being used. The latter skill was checked by randomly exposing among slides which were in alphabetic order, a special set which were in alphabetic order except for one letter referred to as the deception. While reproduction focused on perceptual skill and memory span, identification focused on the same skills plus the ability to apprehend or comprehend the logical pattern and the illogical deception within it. Only children with normal vision participated.

The set of slides and timing for exposure were developed in a prior pilot study. Time exposure was as follows:

- slides with three items: three seconds
- slides with six items: five seconds
- slides with nine items: seven seconds

An interim of five seconds was provided pupils between slides in order that they might transcribe their responses.

Emotional Reaction

The emotional reaction of the pupils with regard to their participation in this study was determined by using a check sheet and rating scale ranging from one through nine. Criteria established for this evaluation of pupil reaction involved amount of verbalization on the part of the pupil, interest in the interview, degree of cooperation, etc. The nine-point scale provided gradations ranging from 1-none, 3-little, 5-moderate, 7-considerable, to 9-extreme, with regard to the evaluation of pupil ease during participation in the study. This feature was included in the study since attitude or set on the part of the subject is known to affect perceptual and/or lingual proficiency.

Hypothesis

The study was designed to test the Null Hypothesis of no difference between pupils of four ethnic groups with regard to reading achievement, lingual deviation and visual perception, with intelligence, sex of pupil, age, grade level and socioeconomic level held constant.

The Sample

One hundred and sixty pupils participated in the study, which was designed to explore the extent of lingual deviation, perceptual acuity and reading achievement within four ethnic groups, Caucasian, Mexican-American, Negro and Oriental. Participants in the study included: 40 Caucasians, 40 Mexican-Americans, 40 Orientals and 40 Negroes. One school was in a lower middle class area and the other in an upper lower class area. Ages ranged from seven years to ten years, three months with a median group age of nine years, three months. Intelligence ranged from 77 to 144, while the median intelligence quotient for the group was 130.6. Eighty-six boys and seventy-four girls participated, of which 88 were fourth-graders and 72 were third-graders.

Scope and Delimitation of the Study

The study involved boys and girls of four ethnic groups: Caucasian, Negro, Oriental and Mexican-American at third and fourth grade level in two schools—one in a lower middle class socioeconomic area, the other in an upper lower class socioeconomic area. Lingual deviation, visual perception and reading achievement were under consideration.

Procedural Steps

A pilot study was conducted to determine the criteria for exploration of lingual deviation and visual perception. A standardized check

sheet was developed for use in structured interviews with pupils to explore lingual deviation. A series of slides was prepared involving letter patterns in order to explore visual perception for placement—initial, medial and terminal letters and also visual memory span.

School administrators were contacted and permission obtained for the study. Prior to the start of the study, scheduling was arranged for interviewing and visual testing. All interviews were conducted at the schools during the school day within the time span of a few weeks. Format of interviewing and testing was randomized and each child was interviewed and tested during a time span of specific duration. Information concerning age, sex, intelligence and reading scores was obtained.

Control Procedures

All of the interviews were conducted by a single researcher and all visual perceptual testing was conducted by a single researcher. Interviewing and testing were done in random order for ethnic groups. Time required for all interviewing at each school was six school days. Each interview and test of visual perception lasted ten minutes with each phase taking five minutes. Exposure times for the slides in the visual perception phase were as follows: group one with three items, three seconds; group two with six items, six seconds; and group three with nine items, seven seconds. Exposure times had been established in a pilot study undertaken prior to the present research, as had procedure for interviews exploring lingual deviation.

Instruments

Reading achievement was obtained on the basis of the *California Achievement Test*. Interviews for lingual deviations and slides used in testing for visual perception had been designed and tested for effectiveness in previous pilot studies. Socioeconomic status was determined according to occupation of parents and use of census tract data with residence address.

Statistical Procedure

Analysis of Covariance was used to analyze the interaction between variables, the independent variable being intelligence, dependent variable being reading achievement and the covariates being socioeconomic level, sex, grade placement, age, emotional reaction to the interview, lingual deviation and visual perception.

Stepwise regression was then used in order to determine the rank according to significance of variables which demonstrated a strong

relationship to reading achievement. Within established degrees of freedom, hypotheses were examined at the .01 and .05 levels of probability. Because stepwise regression deals with only continuous variables which are covariates, grade placement, socioeconomic status and ethnic groups could not be included. Discriminant analysis was done to determine rank order of significance of variables according to ethnic group.

Hypotheses

The hypotheses formulated for this research were considered in terms of the Null Hypothesis of no relationship with regard to reading achievement for the following variables:

Hypothesis

- 1.0 Ethnic group
- 2.0 Intelligence
- 3.0 Socioeconomic level
- 4.0 Sex
- 5.0 Grade placement
- 6.0 Age
- 7.0 Emotional reaction to interview
- 8.0 Lingual deviation
- 9.0 Visual perception

Findings

Analysis of Covariance revealed that grade placement and intelligence had a stronger relationship with reading achievement (.01) than did perception (.10) or lingual deviation (.15). Comparisons of the latter two variables appeared to indicate that perception was more strongly related to reading achievement than was lingual deviation.

The use of stepwise regression revealed that the rank order of variables which interacted significantly with reading achievement were: intelligence, conversational tone, those perceptual, cognitive and retentive skills involved in reproducing a visual pattern of nine letters and identification of the medial deception in the pattern, degree of transitional tendencies and use of incorrect tense in grammatical usage, lack of precision in consonant pronunciation and lack of ability to identify and reproduce nine items in a logical sequence.

Listing of Hypotheses as Validated

Hypotheses

- 1.0 *Ethnic group.* No significant differences were found between

ethnic groups with regard to reading achievement when intelligence was held constant.

2.0 Intelligence. Significant differences were found between ethnic groups in reading achievement. However, when intelligence was held constant, there were no significant differences between ethnic groups with regard to reading achievement.

3.0 Socioeconomic level. No significant difference was found between ethnic groups in reading achievement with regard to socioeconomic levels (lower middle and upper lower levels).

4.0 Sex. No significant differences were found between ethnic groups in reading achievement with regard to sex of pupils.

5.0 Grade placement. A significant difference was found between ethnic groups in reading achievement with regard to grade placement.

6.0 Age. No significant difference was found between ethnic groups with regard to reading achievement on the basis of age.

7.0 Emotional reaction to the interviews. No significant difference was found between ethnic groups in reading achievement on the basis of emotional reaction to the interviews.

8.0 Lingual deviation. A significant difference was found between ethnic groups in reading achievement with regard to lingual deviation in terms of pronunciation of vowels.

9.0 Visual perception. A significant difference was found between ethnic groups in reading achievement with regard to visual perception in terms of perception and discovery of logic in sequence of six and nine letters arrays in which there are alphabetic deceptions.

The step-wise regression indicated that the rank order of variables of significance with regard to reading instruction included visual perception, intonation, pronunciation and intelligence (table 1).

Conclusions

Intelligence appeared to be the variable most related to reading achievement within a comparison of four ethnic groups. Grade placement was also a significant factor as was lingual deviation in terms of pronunciation. The aspects of visual perception which proved to be significant with regard to reading achievement also involved aspects of intelligence, since cognitive ability was required to identify the pattern in which the letters were arranged; discriminative skills were involved in order to determine deception, if any, and memory span was important, in order to recall the letter pattern in reproducing it on paper.

Aspects of intelligence most significantly related to reading achieve-

ment appear to involve skills of identification and discrimination as well as memory span.

Recommendations

The vital role of intelligence with regard to reading achievement has been recognized. The results of this study indicated that there are aspects of intelligence which influence the ability of pupils to make progress in reading. The ability to understand the concepts involved in making discriminations and memory span are two aspects of intelligence which affect reading achievement. Therefore, ability grouping which typically involves the use of intelligence quotients in reading group organization is not sensitive to the effect of those cognitive skills so closely linked with intelligence. Due to many factors, such skills are developed in a most individualized manner; and such development is contingent on many variables, so that satisfactory or higher intelligence quotient is not consonant with their optimum development.

It would be helpful for teachers to have information concerning the development of such cognitive skills as are involved in memory span and the ability to make discriminations. Teaching techniques and related instructional materials could be used in encouraging the development of such intellectual factors which are apparently reading-related skills.

With regard to ethnic group, the results of this study indicated that when intelligence was factored out, there were no significant differences between ethnic groups with regard to reading achievement. Therefore, reading instruction which included consideration of such intelligence-linked sub-skills should be emphasized with all pupils, regardless of considerations of ethnic identification. That is, on the basis of this study, there would appear to be no support for an emphasis on instruction with regard to particular ethnic groups, but rather an instructional program in which all pupils participate which focuses on the development of such reading-related skills as memory span and the ability to make discriminations.

Appreciation is extended to Santa Monica Schools for their cooperation and to principals Mr. Henry Behrens and Dr. Vincent Correll.

TABLE 1

STEPWISE REGRESSION: RELATIONSHIP OF VARIABLES
TO READING ACHIEVEMENT IN RANK ORDER OF
SIGNIFICANCE

<i>Hypothesis</i>	<i>Variable</i>	<i>F Value</i> (.01=6.63) (.05=3.84)
9	Perception: 6 item repro.	29.8**
2	Intelligence	16.6**
8	Intonation	11.3**
9	Perception medial identification (9 items)	6.8*
8	Lingual deviation transition (grammar)	3.9*
	consonant (pronunciation)	3.4
	tense (grammar)	3.2
9	Perception identification/reproduction 9 items	1.9
	9 items and repro.	1.3

** significance at .01 level

* significance at .05 level

TABLE 2

DISCRIMINANT ANALYSIS

<i>Variables</i>	<i>F Score</i>	<i>Means</i>			
	(.01=6.63) (.05=3.84)	Caucasian	Oriental	Negro	Mexican-American
Intelligence	10.4**	107.29	107.42	97.02	102.50
Perception					
9 item-medial	7.3**	5.05	3.60	2.97	4.32
9 item-intial	5.6**	5.55	4.62	5.35	6.80
medial (all)	5.8**	19.50	20.59	20.22	18.34
6 item-terminal	7.7**	4.57	3.37	3.20	3.87
Lingual deviation					
vowel pronunciation	5.6*	1.25	1.37	3.15	1.47

** significance at the .01 level

* significance at the .05 level

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