THE INFLUENCE OF DEVELOPMENTAL LEVEL UPON THE LEARNING OF A SECOND LANGUAGE AMONG CHILDREN OF ANGLO-SAXON ORIGIN

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Thesis presented to the School of Psychology and Education of the University of Ottawa as partial fulfillment of the requirements for the degree of Doctor of Philosophy

Winnipeg, Manitoba, 1963

ACKNOWLEDGMENTS

This thesis was prepared under the supervision of Professor Maurice Chagnon, Ph.D., of the School of Psychology and Education of the University of Ottawa.

The writer is indebted to Mr. V.H.L. Wyatt, Superintendent of schools for St. Vital, Manitoba, in whose School Division the experiment was conducted, to Mrs. Laura Willows, who provided the kindergarten sample, to the Canadian Educational Association for its financial support and to the late Mrs. Marguerite Meyres who conducted the classes under experimental conditions and without whose contribution this project could not have.been carried out.

CURRICULUM STUDIORUM

Louis I. Masson was born November 25, 1923, in Saint Boniface, Manitoba. He received the Bachlor of Arts degree from the University of Manitoba, Fort Garry, Manitoba, in 1944. He received the Master of Education degree in Educational Psychology from the University of Manitoba, Fort Garry, Manitoba, in 1957. The title of his thesis was The Revision of an Educational Acheivement Test for the French-Speaking Soldiers of the Canadian Army.

TABLE OF CONTENTS

LIST OF TABLES

Table page

INTRODUCTION

The teaching of secondary languages poses many problems of an educational and of a psychological nature. Many of these problems have been studied by varied methods, but it is only through the objective examination of specific problems related to this question that one can hope to arrive at sound conclusions.

Among these problems, that of the influence of developmental level upon the learning of secondary languages if of special importance for it affects not only the methods of teaching but it might also influence administrative decisions related to the level at which such teaching should commence.

Presumably, the methods of teaching a secondary language are of utmost importance and it could be expected that the efficiency of the method should reveal itself most adequately in the results obtained. However, apart from the methods of teaching, the age at which such teaching is begun is also of importance for it may be influenced by the receptive capacity of the students.

Opinion regarding the adequacy of teachers and of teaching methods have often been expressed, but less often opinions have been voiced regarding the adequacy of students in the field of secondary language training, and seldom have

studies been made on the influence of developmental level upon second language learning.

The present research project proposes to examine the influence of developmental level upon the learning of a second language. The term developmental level is used instead of the term age because the research is based on a theory proposed by a meurologist and because the purpose of the research is to test in a practical educational setting the tenets which have been proposed on the basis of neurological considerations.

In the first place a review of previous research will be made. Secondly, the main hypothesis will be formulated. Thirdly, a description of the samples used in the research will be given and the specific hypotheses will be elaborated. Finally, the instruments of measurement will be described and the results of the research will be presented.

The appendices will include the raw data, the questionaire sent to parents, a sample of the lessons taught and the achievement tests used in the experiment.

CHAPTER I

REVIEW OF THE LITERATURE

The problem of this study is to investigate the influence of developmental level upon the learning of a second language among children of Anglo-Saxon origin. More specifically, it refers to the learning of French.

Although it is somewhat related to the problem of bilingualism, it is not specifically concerned with this problem except insofar as bilingualism might be considered as a goal of second language training. The main object of the study is to examine the effect of developmental level upon the learning of a second language.

The term developmental level is used in its neurological rather than in its psychological or social sense. Consequently the review of the literature will be concerned first with the findings of neurology. Secondly, it will explore the experimental evidence suggesting the influence of developmental level on second language learning in educational settings.

1. The Findings of Neurology

From the point of view of neurology, the most outstanding and perhaps the only conclusive study found in the

literature is that of Penfield.[1]

In the course of brain operations, Penfield discovered that language learning centers harden as people age. He has claimed that once functional localization of acquired skills has been established, the early plasticity tends to disappear. Having identified four areas of the human cerebral cortex devoted to vocalization, he has stated

> There is an age when the child has a remarkable capacity to utilize these areas for the learning of language, a time when several languages can be learned simultaneously as easily as one language. Later with the appearance capacity for reason and abstract thinking, this early ability is lost.[2]

The foregoing was stated in 1953, Later, in 1959, he stated: "There is a biological clock of the brain as well as of the body glands of children."[3]

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1 W.S.Penfield, "A Consideration of the Neuro-physiological Mechanism of Speech and Some Educational Consequences". in Bulletin of the American Academy of Arts and Sciences, Vol. 82, No. 5, p. 199-214.

2 Ibid., p. 1990214.

3 W.S.Penfield and L.Roberts, Speech and Brain Mechanisms, Princeton, New Jersy, Princeton University Press 1959, p. 238.

On the basis of this biological clock he has added:

> The time to begin what might be called a general schooling in secondary languages, in accordance with the demands of brain physiology, is between the ages of four and ten. The child sets off for school then, and he can still learn new languages directly without interposing the speech units of his mother tongue.[4]

With the exception of Penfield, neurologists do not seem to have been particularly interested in the learning of second languages for very few reports were found in the literature.

However, one might mention the work of Anton Leischner,[5] who proposed a neurological theory of bilingualism based on the switching mechanism located at the posterior edge of the Sylvian fossa. This study was not particularly related to developmental factors and is therefore of lesser importance in the present study.

Hebb[6] and Milner[7] have shown some interest in the

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4 Ibid., p. 255.

5 A.Leischner, "Uber die Aphasie der Mehrsprashigen", Archiv fur Psychiatrie und Nervenkrankheiten, No. 180, 1948, p. 731-775, reported by Sister Mary Andrew Hartmann, "Variables Considered in the Measurement of Bilingualism a Review of Literature", in Revue de l'universite d'Ottawa, Vol. 31, No. 1, 1961, p. 71.

6 D.O.Hebb, Orginization of Behavior, New York, Wiley and Company, 1949.

7 P.M.Milner, "The Cell Assembly: Mark II", In Psychological Review, Vol. 64, No. 4, 1957, p. 242-252.

neurological basis of language and of second language development but their interest has been centered on the functional operations of certain areas of the cerebral cortex rather than on the changes that might occur through developmental influences.

Thus, as was mentioned previously, Penfield was the only one who related second language development to the developmental aspects of neurology.

2. Review of Experimental Evidence

In reviewing experimental evidence dealing with the influence of developmental level upon the learning of a second language, one is again struck by the dearth of studies in this specific area. The literature reports many studies on bilingualism, on its measurement, on its relationship with intelligence, achievement and motivation, but few deal with its relationship with developmental level.

Norsworthy and Whitley, suggesting that children's memory tends to depend primarily on the depth of the impression for recall of a fact have stated that: "It behooves the educator to take advantage of this tendency and to fix in children's minds certain more or less isolated facts, such as modern language vocabularies."[8]

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8 Naomi Norsworthy and Mary Theodora Whitley, The Psychology of Childhood. New York, Macmillan Campany, 305 p.

The foregoing statement might well lead into an investigation of the scientific studies which have been carried out on this continent in the area of second language learning.

The first scientific investigation of second language learning was carried out on this continent from 1924 to 1927 through the Modern Language Study.[9]

This study revealed much variability in method across the country, as well as in the age at which modern language was begun. The result of this investigation was mostly to emphasize the teaching of foreign grammar and foreign culture rather than the teaching of foreign language.

The second major study was the Stanford Language Arts Investigation,[10] started in 1936.

The chief object of this study was to help reorganize the foreign language programme and to replace the language skills in their proper perspective, that is as means of attaining proficiency in the foreign language being studied.

In chronological order, the next major investigation was the Chicago Investigation of Second Language Teaching.[11]

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9 A.Coleman, The Teaching of Modern Foreign Languages in the United States, Macmillan Company, 1939, 299 p.

10 W.V.Kaulfers, Modern Languages for Modern Schools, McGraw-Hill, 1942, 525 p.

11 F.B.Agard and H.B.Dunkel, An Investigation of Second Language Teaching, Ginn and Company, 1948, 344 p.

The main objective of this study was to compare the aural/oral methods of teaching with grammer translation methods.

Although in some isolated instances[12] some differences were found between the achievement of those students who had been taught by the aural/oral method and the other groups, in most instances: "adequate controls and valid pretests and postests of ability and achievement subjected to rigorous statistical analysis are missing."[13]

In 1953, the movement which came to be known as FLES was born, and it prompted most of the literature which has appeared since on instruction of modern languages.[14]

Although the movement of Foreign Languages in the Elementary School has gained much impetus and has been given much publicity, it still remains exploratory and its programmes are often based on intuition of principals, and of groups of parents. This has prompted scientifically minded

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12 Emma M. Birkmaier, An Investigation of the Outcomes in the Eclectic, Reading, and Modified Army Methods in the Teaching of a Second Language, Unpublished Doctor's Thesis, University of Minnesota, 1949, quoted by Emma M. Birkmaier, "Modern Languages," in Encyclopedia of Educational Research, New York, Macmillan, 1960, p. 867.

13 Ibid., p. 867.

14 Ibid., p. 879.

educators to deplore the unscientific nature of the programme.[15]

Dunkel and Pillet, who are among the chief proponents of FLES have said:

> We need more research at all levels, both the laboratory exploration of the fundamentals of language learning and the classroom examination of various procedures and methods. Better measuring devices are, of course, the sine qua non here. Without more demonstrated theory and more carefully examined practice, FLES programmes will continue to explore blind alleys and waste students' time by trial and error.[16]

Thus, as was the case with other major investigations, FLES has still not given completely adequate answers to the questions under study in this thesis.

In the area of methodology, there also remain a good deal of unanswered questions, and, perhaps, the foremost of these is that of a learning theory. In this respect, Tyler[17] has listed seven questions which he feels should be answered by a learning theory. However the question of the influence of developmental level has not even

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15 Josephine R. Bruno and S.O. Simches, "Psycho-Linguistic Rationale for FLES," in French Review, Vol. 35, No. 6, p. 583-586.

16 H. B. Dunkel and R. A. Pillet, French in the Elementary School, The University of Chicago Press, 1962, p.144.

17 R. W. Tyler, "The Need for a More Comprehensive Formulation of Theory of Learning a Second Language", in The Modern Language Journal, Vol. 32, No. 8, p. 559-567.

been posed.

The teaching of vocabulary, a major concern of the present study has received more attention by researchers than other aspects of second language instruction.

Tharp[18] directed some investigations on the measurment of vocabulary difficulty in terms of density index, frequency index and difficulty frequency index. These are based entirely on reading vocabulary and do not refer to oral vocabulary.

Kale[19] on the other hand, presented some evidence showing that when vocabulary words are paired with objects, they are more likely to be retained than when they are paired with first language words. This is of course a commonly held belief.

Still, as methodology is not a primary concern of this study, it is best, perhaps, to examine the available evidence on the factors which stem from the student hemself.

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18 J.Tharp, "The Measurement of Vocabulary Difficulty", in The Modern Language Journal, Vol. 24, No. 3, p. 169-178.

19 Shikrishna Kale, Learning and Retertion of English-Russian Vocabulary under Different Conditions of Motion Picture Presentation, Unpublished Doctor's Dissertation, Pennsylvannia State College, 1953, 189 p.

In this connection, many studies have investigated the influence of intelligence, of verbal ability, of pitch discrimination, of study habits, of motivation and attitudes and of personalities. These were summarized recently by Pinsleur, Mosberg and Morrison.[20]

They generally show that there is a positive relationship between the learning of second languages and intelligence and verbal ability. On the question of study habits, it is shown that these play their part in second language learning. Pitch discrimination, on the other hand, seems to be an uncertain factor while motivation and attitudes apparently also correlate positively with second language learning. Personality factors, while playing their part in second language learning vary in the direction in which this part is played according to individual differences.

It must be stated that the foregoing reviews refer mostly to the achievement of children over the age of twelve, and, as the authors have stated: "the grammar school and the high school need far more research attention."[21]

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20 P.Pimsleur, L.Mosberg and A.L.Morrison, "Student Factors in Foreign Language Learning", in The Modern Lanuage Journal, Vol. 46, No. 4, p. 160-170.

21 Ibid., p. 169.

The problem directly under study in the present thesis was investigated recently by Larew,[22] who reviewed some of the literature dealing with optimum age for beginning a foreign language and reported on an experiment conducted by the author in the articulation of Spanish phonemes.

According to this author, the only research study pertaining directly to the problem of the relationship of age with second language learning is that of Penfield.[23]

To test this relationship, the author conducted an experiment in which a test of articulation , constructed by the author, attempted to measure pupils' ability to reproduce Spanish phonemes articulated by the teacher. The test was administered to ten pupils in each age category seven through eleven as well as to ten pupils in the age fourteen category after each group had been taught four Spanish lessons.

The results of the experiment showed that the mean articulation scores were highest at the age seven level. However no tests of significance were reported.

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22 Leonor A. Larew, "The Optimum Age for Beginning a Foreign Language", The Modern Language Journal, Vol. 45, No. 5, p. 203-206.

23 Penfield, Op. Cit., xiii-286 p.

Kirch[24] reported an experiment in which German was taught at the first, third and sixth grade levels. He found that third graders did better than sixth graders and that the first graders were best of all. This experiment was based again on articulation and no statistical analysis was reported.

Moreover, the author states that: "many of the children in the first grade class (...) had parents and grandparents whose native tongue was German."[25]

His conclusion that: "FLES should be begun in the first grade if possible."[26] is hardly justified because the foregoing statement which obviously invalidates the experiment, shows that he had not imposed any rigid controls.

Andersson[27] attempted to sift available evidence to determine when instruction in a second language should begin. He concluded that: "the optimum age seemed to fall within the span of ages four to eight."[28]

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24 M.S.Kirch, "At What Age Elementary School Language Teaching?", in The Modern Language Journal, Vol. 40, No. 7, p. 399-400.

25 Ibid., p. 400.

26 Ibid., p. 400.

27 T.Andersson, The Optimum Age for Beginning the Study of Modern Languages, quoted by J.A.Green in Research on Language Teaching, Seattle, University of Washington Press, 1962, xix-280 p.

28 Ibid., p. 146.

The foregoing review of the literature shows that few studies have been made in the area of the influence of developmental level upon second language learning. Furthermore it shows that the studies which were made were not adequately controlled and that the only reliable evidence of such influence stems from neurological considerations which have not been adequately tested in educational settings. Penfield[29] tested his neurological findings on his own children, but, such an experiment is obviously limited by small numbers and by lack of adequate controls.

In the light of the foregoing review, the writer has sought to find if, in an educational setting, the findings of neurology could be tested and if children below the age of ten tended to learn a second language more efficiently than those who had reached their second decade of life.

More specifically, the problem can be stated in the form of the null hypothesis: there will be no significant difference between the achievement in French of five to six year old children of Anglo-Saxon origin and that of eleven to twelve year olds of similar ethnical background after both groups have been subjected to comparable periods of teaching in French.

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29 Penfield, Op. Cit., xiii-286 p.

CHAPTER II

EXPERIMENTAL DESIGN

This chapter presents the procedures involved in conducting the experiment to test the hypothesis proposed in the preceding chapter.

Initially a description is given of the teaching method used in the experiment. There follows a description of the specific operations of teaching. The sample population is then described and the principles of selection are elaborated. The testing procedures are next given, and, finally, an elaboration is made of the three sub-hypotheses along with their required statistical procedures.

1. The Teaching Methods.

In his theory of language learning, Penfield has stated:

> The learning of language by the direct method (the mother's method) is far more successful than the school-time learning of secondary languages in the second decade of life (language education).[1]

He has given two reasons for this. The first is physiological and the second is psychological.

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1 W. Penfield and L. Roberts, Speech and Brain Mechanisms, Princeton University Press, 1959, xiii-286 p.

The physiological reason is derived from the fact that "a child's brain has a specialized capacity for learning language--a capacity that decreases with the passage of years."[2]

The psychological reason is that of the psychological urge. In this respect, Penfield has stated:

> For the child at home, the learning of language is a method of learning about life, a means of getting what he wants, a means of satisfying the unquenchable curiosity that burns in him almost from the beginning. He is hardly aware of the fact that he is learning language, and it does not form part of his primary conscious goal.
>
> The same may be true of a young child who is learning a new language in school, but it is only true if no other language is being spoken, for the time being in the class room. The direct method is then employed in school, but the impetus for learning should still not be to collect words nor to acquire language. It should be to achieve success in games and problems, and in learning about life and other delightful things.[3]

In conducting the present experiment, the physiological reason for the use of the direct method was not to be disputed. Penfield[4] has shown that on the basis of neurological considerations a child is more likely to be able to acquire a second language in the first decade of his life than he is in the second. However the psychological reason

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2 Penfield, Op. Cit., p. 240.
3 Id., ibid., p.241.
4 Id., Ibid., p. 240.

for the use of the direct method was a foremost consideration and the conditions of class room teaching were to be as close as possible to those found in the home.

2. The Operations of Teaching.

In order to approximate as closely as possible the conditions of the home, the following had to be fulfilled.

1. The atmosphere had to be informal.
2. No other language but the secondary one had to be used at all times.
3. The teaching had to be centered on matters close to the children's environment.

To fulfill these conditions, classes were designed to take place in the school, but outside of school hours. They were conducted in as informal an atmosphere as possible and for this purpose, the children themselves arranged the desks or chairs as they wished. Under no condition did the teacher speak any language other than the secondary one (in this instance, French). The teaching matter was confined to parts of the body, the family, the home, household pets and household furniture and accessories. The actions taught were those commonly carried out in the home.

In the case of parts of the body, reference was made directly to the part of the body involved, in the case of the family, of the home, and of household pets,

pictures were used, while in the case of furniture and accessories, the actual objects were taken to the class room. As for the teaching of actions, the actual action was carried out.

More specifically, twenty-eight lessons were conducted over a four month period. As there were two groups of children, the lessons were conducted for both groups by the same teacher. Each lesson was prepared in all its detail and was conducted in an identical manner with each group. Each lesson was of one hour's duration and was conducted in four parts with a recess period every fifteen minutes.

The teaching consisted of pointing to parts of the body, to pieces of furniture or to pictures of members of the family and simultaneously of saying the corresponding word in French.

3. The Sample Population.

In order to test the main hypothesis, two groups of children had to be selected. One was to be below the age of ten and the other was to be in its second decade of life.

To meet this criterion, the first group (referred to as Group I) was selected from a population of children attending a private kindergarten. The total population of

children attending this kindergarten was sixty and the ages therein ranged from four to six years. The second group (referred to as Group II) was selected from a population of children attending Grade VI in a public school. The age distribution of these children is shown in Table I.

Table I.-

Mean Ages and Standard Deviation of Two Groups of Children Expressed in Months

Group	N	M	S.D.
I	30	65.533	3.451
II	30	136.733	2.958

In order to ascertain that all children were of Anglo-Saxon origin and that none had previously been subjected or exposed to the secondary language, a questionnaire regarding racial origin and previous language training was sent to all parents. Only those children who met with the racial origin and previous language training criteria were selected for the experiment. A copy of the questionnaire is shown at Appendix 2.

To eliminate the possibility of learning impediments, it had been decided that all subjects were to be of above average intelligence, and that there should be no significant difference between the two groups in intelligence test scores.

To meet the foregoing criterion, each child selected on the basis of racial origin and age was administered the Stanford-Binet Intelligence Scale (Form L-M). Only those whose scores were in the 110-120 range were included in the final sample.

Table II presents the mean mental ages of both groups and the resulting mean IQ's.

Table II.-

Means and Standard Deviations of Mental Ages and IQ's of Two Groups of Children of Different Developmental Levels.

		MA		IQ	
Group	N	Mean	S.D.	Mean	S.D.
I	30	74.3	3.91	114.53	2.64
II	30	162.33	3.13	114.56	2.37

Although the data presented in Table II shows that the intelligence level of both groups is similar, these data were subjected to the "t" test of significance between means to ascertain that there was no significant difference between the two groups insofar as intelligence was concerned.

Table III presents the comparison of the IQ scores between the two groups.

Table III.-

Comparison of Mean IQ's of Two Groups of Children of Different Developmental Levels.

Group	N	M	σ_{DM}	"t"
I	30	114.53		
			.9496	.0347
II	30	114.56		

Table III shows that the null hypothesis of differences between means is tenable insofar as intelligence level is concerned for the "t" ratio in this instance is .0347, giving a probability higher than the .05 level. More specifically, this would mean that the difference between the two means is a difference which can be very reasonably attributed to chance.

A further test of significance was made by examining the data in terms of homogeneity of variance. For this purpose the "F" test of homogeneity was applied and its results are shown in Table IV.

Table IV.-

"F" Test of Homogeneity of Variance Applied to Intelligence Test Scores of Two Groups of Children of Different Developmental Levels.

Group	N	S^2	F
I	30	7.222	
			1.253
II	30	5.840	

The obtained value of "F" in the foregoing table is less than the value significant at the .05 percent level and therefore, the probability value attaching to it must be greater than .05. The hypothesis of a common population variance can thus be regarded as tenable and this further enhances the acceptability of the null hypothesis claiming, in this instance, that there is no significant difference between the two samples insofar as intelligence level is concerned.

Thus, in summarizing, it may be said that the two samples selected for the experiment met with the previously mentioned criteria. In the first place, one sample was comprised of children below the age of ten and the other was comprised of children in their second decade of life. In the second place, both samples were drawn from a population of Anglo-Saxon origin. Finally, both samples were of above average intelligence and no significant difference was found between their mean IQ's as measured by the Stanford- Binet Intelligence Scale (Form L-M).

4. The Testing

The testing in the present experiment called for special procedures. As both samples had been taught in identical manner and as the content of teaching had been

the same, the testing procedures had to be identical for both groups. Moreover, as the entire course of teaching had been oral, the testing had to be oral as well.

Initially, it had been decided that the testing should measure the extent of vocabulary, the extent of comprehension and the accuracy of expression. However, it was soon discovered that no adequately objective means could be found for the testing of accuracy of expression. Expression must be tested much more subjectively than extent of vocabulary or extent of comprehension for it depends to a large extent on the opinion of the examiner. Consequently, it was decided, for the purpose of this experiment, that the testing should comprise only the extent of vocabulary and the extent of comprehension.

The vocabulary taught during the teaching sessions had been limited. It had dealt with the parts of the body, pieces of furniture, household accessories and household pets. Therefore, the test of vocabulary had to be limited to these areas. From the subject matter taught, fifty items of vocabulary were selected. They were selected at random and represented material taught in all the lessons.

The test of vocabulary was administered in individual interviews with each child. In each case, the child was placed in a room where all the objects taught were

displayed. He was asked in a standard manner to point to the object which the French stimulus word, pronounced by the examiner, represented. If he pointed to the correct object, he was given a score of one and if he pointed to the incorrect object or to no object at all, he was given a score of zero. Thus, his total score could range from fifty to zero.

The Comprehension Test was carried out similarly. In each case, the child was asked in a standard manner to carry out the action which the stimulus French word or group of words implied. If he performed the correct action, he received a score of one and if he performed an incorrect action or no action at all, he received a score of zero. In this instance, the total number of actions was twenty-five. These again had been selected at random from the material taught during the twenty-eight sessions.

The foregoing tests had been devised specifically for the purpose of the present experiment and it is unlikely that they could be used for any other purpose other than that of testing achievement based on the course of instruction given during this experiment.

However, it was felt necessary that a study should be made of the test itself as it was applied to the samples of the experiment. Consequently, an item analysis was

carried out for the purpose of determining the difficutly value of each item as applied to each sample and the degree to which each item correlated with the total test. The reliability of the test was measured on the basis of its administration to the two samples.

5. The Specific Hypotheses.

The general hypothesis in the present study has been that among children of Anglo-Saxon origin, there was no significant difference between the achievement of five to six year olds and that of eleven to twelve year olds in French language skills. The hypothesis had been limited to those children whose level of ability (as measured by the Stanford-Binet Intelligence Scale Form L-M) ranged between IQ's of 110 and 120.

The specific hypotheses were the following:

1. Among children of Anglo-Saxon origin, whose IQ's range between 110 and 120, there is no significant difference between the achievement in combined extent of French vocabulary and French comprehension of a group of five to six year olds and that of a group of eleven to twelve year olds after both groups have been subjected to comparable periods of teaching in French.

2. Among children of Anglo-Saxon origin, whose IQ's range from 110 and 120, there is no significant difference

between the achievement in extent of French vocabulary of a group of five to six year olds and that of a group of eleven to twelve year olds after both groups have been subjected to comparable periods of teaching in French.

3. Among children of Anglo-Saxon origin, whose IQ's range between 110 and 120, there is no significant difference between the achievement in extent of comprehension of French between a group of five to six year olds and that of a group of eleven to twelve year olds after both groups have been subjected to comparable periods of teaching in French.

In order to test the foregoing hypotheses, the "t" test of significance between means was used as well as the "F" test of homogeniety of variance.

The first test was used to determine if there were significant differences between the means of the two groups in both Vocabulary and Comprehension Tests and the second was used to determine if the standard error of the difference between means could be obtained by combining the variances of both samples to obtain a common variance.

Turning to the statistical techniques utilized, raw scores were used in all instances and the item analysis study was carried out in the following manner:

The difficulty value of each item was calculated on the basis of proportions of success for each item of each

test with each sample. It was not felt necessary to correct these difficulty values for chance because chance factors were considered to play little part in the choice of correct responses by the subjects. In the case of the Vocabulary Test, the number of choices, being the number of objects displayed, amounted to more than one hundred and therefore the subjects had less than one chance in one hundred to give the correct response by guessing. In the case of the Comprehension Test, only one choice was given (the stimulus French action expressed by the examiner).

The difficulty values were therefore calculated on the basis of the number of correct responses given to each item. These are presented in Appendix 1.

The item reliability indices were calculated by using the biserial coefficient of correlation given by the following formula:[5]

$$r_{bis} = \frac{\bar{Y}_2 - \bar{Y}_1}{\sigma_y} \cdot \frac{pq}{y}$$

Where $\bar{Y}_2$ is the mean score of subjects passing the item, $\bar{Y}_1$ is the mean score of subjects failing the item,

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5 L.T. Dayhaw, Manuel de Statistique, Ottawa, Canada, Editions de l'Universite d'Ottawa, 1958, xxii-530p.

σ_y is the standard deviation of the total distribution, pq is the product of the proportion of passes by the proportion of failures and y is the height of the ordinate of the normal probability curve at the point where p and q meet. These item reliability indices are presented in Appendix 1.

The total test reliability was measured for each test and for each sample by the use of the Kuder-Richardson formula number twenty.[6] This formula is:

$$r_{tt} = \frac{n}{n-1} \cdot \frac{s_t^2 - \sum pq}{s_t^2}$$

where r_{tt} is the reliability of the total test, n is the number of items in the test, s_t^2 is the variance of the total test and pq has the same value as in the preceding formula.

The foregoing formula was used because, according to Thorndike, "It is the most serviceable in estimating the consistency of performance on a relatively homogeneous power test when interest is focused on consistency of performance at a particular point in time."[7]

In this particular instance, the content of the test can be said to be relatively homogenous because it measures only what has been taught. The tests were essentially power tests because no time limits were imposed and, finally, an

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6 R.L. Thorndike et al., Educational Measurement, American Council on Education, 1950, xx- 819 p.

7 Ibid., xx-819 p.

estimate of consistency at a particular point in time was sought.

Since this project deals with small samples, the significance of the difference in mean scores between the kindergarten and the Grade VI groups was evaluated by the following formula:[8]

$$t = \frac{D}{\sigma_{DM}}$$

where

$$\sigma_{DM} = \sigma_{c.s.}\sqrt{\frac{1}{N_1} + \frac{1}{N_2}}$$

and

$$\sigma_{c.s.} = \sqrt{\frac{\sum (X_1 - M_1)^2 + \sum (X_2 - M_2)^2}{N_1 + N_2 - 2}}$$

As for the "F" test, the following formula was used:[9]

$$F = \frac{S_1^2}{S_2^2}$$

where

$$S_1^2 = \frac{\sum (X_1 - M_1)^2}{N-1}$$

The following chapter will be devoted to the presentation of results of the experiment and to a discussion of some implications.

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8 L.T.Dayhaw, op. cit., xii-530p.

9.A.L.Edwards, Experimental Design in Psychological Research, New York, Rinehart and Company, Inc., 1957,xiv-446p.

CHAPTER III

PRESENTATION AND DISCUSSION OF RESULTS

The preceeding chapters have reviewed previous research dealing with second language learning. They have also presented an experimental design whereby the testing of hypotheses dealing with second language learning could be carried out.

The present chapter will present the results of the experiment which forms the basis of this study.

1. The Item Analysis.

As the test used in the present experiment was an original test based on the content of instruction given during the experiment, it was considered necessary to do an item analysis on the basis of the tests as administered to the two samples. The purpose of the item analysis was to establish the difficulty value of each item as applied to each sample and the relationship between each item and the total test as applied to each sample.

As was mentioned in the previous chapter, the difficulty values and the reliability indices of each item are listed in Appendix 1.

It is to be noted that some of the reliability indices are relatively low while others are very high. However

there remains that the difficulty values of items within each test and for each sample have a relatively narrow range as is shown in Table V.

Table V.-

Distribution and Means of Difficulty Values of Items for the Vocabulary and Comprehension Tests of Two Groups of Children of Different Developmental Levels.

Group	Test	80-89	70-79	60-69	50-59	40-49	30-39	20-29	M
I	Voc.	1	31	17	1				.664
	Comp.		1	5	13	6			.531
II	Voc.		1	13	26	10			.384
	Comp.				2	10	12	1	.547

Table V shows that the mean difficulty values for the four tests range from .384 to .664.

In connection with difficulty values of items Symonds[1] has stated that the level of ability of an individual is best indicated by an item which makes the most discriminations. Hence, the item which is passed and failed by an equal number of subjects is the best. Table V shows that the lowest difficulty value in the tests of this experiment was .384 and that the highest was .664. It could then be inferred that a relatively large number of discriminations is made by each test, and hence, the ability of the subjects tends to be adequately measured.

Should these tests be readministered to similar groups, some of the items with low reliability indices would be rejected and the items would be rearranged in order of difficulty. However, such is not the purpose of the present experiment.

2. The Reliability of the Test.

As the item analysis had been necessary to establish the value of each item, so was a study of the reliability of the total tests.

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1. P.M.Symonds, "Choice of Items for a Test on the Basis of Difficulty," Journal of Educational Psychology, Vol. 20, No. 7, October 1929, pp. 481-493.

In this instance, the degree to which the tests were consistent at a particular point in time was to be measured.

Table VI presents the data concerning the reliability of each test as administered to each sample.

Table VI.-

Reliability Coefficients of Vocabulary and Comprehension Tests for Two Samples of Different Developmental Levels.

Groups	N	Vocabulary	Comprehension
I	30	.812	.596
II	30	.826	.596

Table VI shows that the reliability coefficients are sufficiently high to warrant a statement that the tests, as administered to the present samples, are reliable.

An underlying assumption of the Kuder-Richardson formula is that all items measure a single factor. Although in the present tests, all items measured the material taught, the variation in their reliability indices could indicate that there is a certain amount of heterogeneity among items. However, as Thorndike has pointed out:

> In proportion, as heterogeneity appears in the test from item to item or from one group of items to another, Kuder-Richardson formula #20 will provide an underestimate of the correlation between equivalent forms.[2]

Thus, if the coefficients of correlation shown in Table VI are underestimated of the correlation obtainable between equivalent forms, it would be reasonable to state that the present tests are reliable.

3. The Standard Error of the Difference Between Means.

As was stated previously, it was necessary to test the homogeneity of variance between the two groups for each test in order to determine if both groups could be combined

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2. R.L. Thorndike Op. Cit., xx-819 p.

to establish the standard error of the difference between means. This was done through the use of the "F" test and the results are shown in Table VII.

Table VII.-

F Test of Homogeneity of Variance Between Combined Vocabulary and Comprehension Tests for Two Groups of Different Developmental Levels.

	Variance		
Test	Group I	Group II	F
Combined	108.616	118.868	1.094[a]
Vocabulary	51.771	64.368	1.243[a]
Comprehension	14.309	13.596	1.0524[a]

a Not Significant at .05 level.

Table VII shows that none of the obtained values of F is significant at the .05 level. Thus, in each case, the hypothesis of a common population variance could be regarded as tenable, and hence it was permissible to combine samples in order to obtain the standard error of the differnece between means.

4. Total Test Scores of the Kindergarten and Grade VI Groups.

The main purpose of the present experiment had been to measure the differnece in achievement in French of the two Groups of children of Anglo-Saxon origin after both groups had been subjected to comparable periods of teaching in French.

Table VIII presents the means of combined Vocabulary and Comprehension test scores for each group as well as the difference between means and the significance of the difference.

Table VIII.-

Comparison of Combined Vocabulary and Comprehension Test Scores of Two Groups of Different Developmental Levels.

Group	N	M	Diff.	σ_{DM}	t
I	30	47.93			
			11.33	2.752	4.117[a]
II	30	36.60			

a Significant at .001 level.

Table VIII shows that when Vocabulary and Comprehension scores are combined for both groups, the difference between the means of the two groups is highly significant. As the highest of the two means is that of the kindergarten group, it can be inferred that this group was significantly better on the total test than was the other.

The difference in extent of vocabulary between the two groups will be discussed next.

5. Vocabulary Scores of Kindergarten and Grade VI Groups.

The second sub-hypothesis had stated that there was no significant difference between the means of the two experimental groups, insofar as extent of vocabulary was concerned.

Table IX presents the means of Vocabulary scores for each group as well as the difference between means and the significance of the difference.

Table IX.-

Comparison of Mean Vocabulary Test Scores of Two Groups of Different Developmental Levels.

Group	N	M	Diff.	σ_{DM}	t
I	30	34.56			
			7.66	1.96	3.90[a]
II	30	26.90			

a Significant at .001 level.

Table IX shows that the difference in extent of French vocabulary between the two groups is highly significant. Again, the mean of the kindergarten group being the highest, it can be inferred that this group succeeded significantly better than did the other.

The difference in extent of French comprehension between the two groups will be considered next.

6. The Comprehension Scores of Kindergarten and Grade VI Groups.

The third sub-hypothesis had stated that there was no significant difference between the means of the two experimental groups in extent of French comprehension.

Table X presents the data concerning the comparison of the two groups in extent of comprehension.

Table X.-

Comparison of the Mean Comprehension Test Scores of Two Groups of Different Developmental Levels.

Group	N	M	Diff.	σ_{DM}	t
I	30	13.36			
			3.66	.964	3.801[a]
II	30	9.70			

a Significant at .001 level.

Table X shows that the difference between means of the French Comprehension Test scores is highly significant.

Once again, the difference is in favour of the kindergarten group, indicating that this group achieved significantly better in the Comprehension Test than did the group from Grade VI.

Thus in the combined test, in the Vocabulary Test and in the Comprehension Test, the younger group achieved significantly better than did the older one. The conclusions and the implications which may be drawn from these findings are discussed in the following section of this thesis.

SUMMARY AND CONCLUSIONS

The present study had set as its purpose an investigation of the influence of developmental level upon the learning of a second language among children of Anglo-Saxon origin. In this instance, the second language was French.

A review of the literature brought out the theories and the previous experiments conducted in the field of second language teaching and learning. An experimental design was then elaborated whereby the main hypothesis and the three sub-hypotheses were to be tested. This involved the designing of a course of instruction in French and of a Vocabulary and a Comprehension test. These tests were analyzed and their reliability was studied. Following this, the results of the experiment were presented and discussed.

The Vocabulary Test and the Comprehension Test were found to have satisfactory reliability and their individual items were found to be adequately discriminating.

The findings of the investigation led to the rejection of the null hypothesis which stated that there was no significant difference between the achievement in French of a group of five to six year old children of Anglo-Saxon origin and that of an ethnically similar group of eleven to twelve year olds after both groups had been exposed to comparable periods of teaching in French.

The three sub-hypotheses, stating that there were no significant differences in total achievement in extent of vocabulary and in extent of comprehension between the two groups, were also rejected. In all cases, it was found that the younger group achieved better than the older one and in all cases the differences were highly significant. No investigation was made of the achievement in oral expression.

The limitations to this conclusion imposed by the present experiment are that the teaching be conducted orally and that no use be made of the first language.

An administrative implication which could be derived from this conclusion is that the learning of French could better be achieved by children of Anglo-Saxon origin if the teaching were conducted before they have reached the age of ten.

For the purpose of further research, an experiment similar to the present one could be conducted with larger groups of different intelligence levels. A further experiment could attempt to measure the achievement in oral expression of groups similar to those used in this study. The degree to which the personality of the teacher influences the achievement of students could also prove to be a worthwhile field of investigation.

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APPENDIX I

THE RAW DATA

APPENDIX I

RAW DATA

Table XI.-

Chronological Ages, Mental Ages and Intelligence Quotients (Group I)

Subject	CA	MA	IQ
1	67	76	115
2	66	76	117
3	67	78	118
4	62	70	114
5	66	74	114
6	63	72	116
7	64	75	119
8	64	74	119
9	65	77	119
10	67	76	115
11	62	69	112
12	70	77	111
13	67	74	112
14	60	68	114
15	69	78	115
16	64	73	116
17	69	80	118
18	68	78	117
19	64	74	117
20	63	72	116
21	60	68	114
22	69	77	113
23	63	71	114
24	71	79	113
25	69	76	112
26	71	79	113
27	61	68	112
28	72	79	111
29	60	66	110
30	63	69	110

Table XII.-

Chronological Ages, Mental Ages and Intelligence Quotients (Group II)

Subject	CA	MA	IQ
1	134	161	116
2	137	164	116
3	138	167	117
4	138	165	116
5	135	162	116
6	132	162	119
7	139	165	115
8	136	160	114
9	139	162	113
10	137	164	116
11	138	166	117
12	132	163	119
13	134	163	118
14	134	160	116
15	138	163	115
16	141	167	115
17	140	164	114
18	142	167	114
19	134	158	114
20	135	160	115
21	136	164	117
22	141	161	111
23	143	165	112
24	136	159	113
25	138	158	111
26	136	156	110
27	143	167	113
28	140	162	112
29	139	159	111
30	135	156	112

Table XIII.-

Total Test Scores (Group I)

Subject	Scores
1	65
2	65
3	63
4	61
5	60
6	59
7	56
8	56
9	58
10	52
11	50
12	52
13	54
14	48
15	45
16	49
17	47
18	43
19	48
20	44
21	45
22	41
23	39
24	38
25	35
26	37
27	32
28	34
29	32
30	30

Table XIV.-

Total Test Scores (Group II)

Subject	Scores
1	61
2	60
3	55
4	50
5	46
6	46
7	46
8	40
9	39
10	39
11	40
12	37
13	39
14	43
15	37
16	36
17	33
18	34
19	30
20	33
21	31
22	28
23	28
24	25
25	28
26	24
27	26
28	23
29	21
30	20

Table XV.-

Vocabulary and Comprehension Test Scores (Group I)

Subject	Vocabulary	Comprehension
1	45	20
2	45	20
3	43	20
4	42	19
5	42	18
6	41	18
7	41	15
8	41	15
9	41	17
10	40	12
11	40	10
12	38	14
13	38	16
14	37	11
15	36	9
16	36	13
17	35	12
18	33	10
19	32	16
20	32	12
21	31	14
22	30	11
23	27	12
24	27	11
25	26	9
26	25	12
27	24	8
28	24	10
29	23	9
30	22	8

Table XVI.-

Vocabulary and Comprehension Test Scores (Group II)

Subject	Vocabulary	Comprehension
1	41	20
2	41	19
3	38	17
4	38	12
5	37	9
6	36	10
7	34	12
8	34	6
9	32	7
10	30	9
11	30	10
12	28	9
13	29	10
14	28	15
15	28	9
16	27	9
17	25	8
18	25	9
19	23	7
20	23	10
21	22	9
22	21	7
23	20	8
24	19	6
25	18	10
26	17	7
27	17	9
28	16	7
29	15	6
30	15	5

Table XVII.-

Vocabulary Item Difficulty Values

Item	Group I	Group II	Item	Group I	Group II
1	.56	.56	26	.70	.50
2	.63	.56	27	.70	.46
3	.66	.53	28	.70	.40
4	.66	.56	29	.70	.66
5	.74	.53	30	.74	.46
6	.73	.50	31	.70	.56
7	.64	.53	32	.70	.46
8	.74	.60	33	.70	.50
9	.80	.50	34	.74	.46
10	.64	.50	35	.66	.50
11	.64	.50	36	.74	.60
12	.66	.46	37	.70	.40
13	.70	.50	38	.74	.53
14	.70	.50	39	.70	.60
15	.70	.60	40	.66	.60
16	.70	.46	41	.66	.53
17	.66	.56	42	.66	.63
18	.70	.50	43	.70	.60
19	.70	.43	44	.70	.60
20	.74	.50	45	.64	.60
21	.70	.50	46	.66	.60
22	.70	.56	47	.66	.73
23	.64	.56	48	.70	.60
24	.74	.50	49	.76	.56
25	.66	.46	50	.74	.66

Table XVIII.-

Comprehension Item Difficulty Indices

Item	Group I	Group II
1	.70	.46
2	.60	.40
3	.50	.43
4	.56	.46
5	.46	.26
6	.50	.36
7	.46	.43
8	.60	.36
9	.56	.33
10	.60	.33
11	.53	.40
12	.46	.33
13	.56	.30
14	.43	.50
15	.60	.33
16	.56	.43
17	.56	.46
18	.50	.43
19	.56	.30
20	.50	.33
21	.53	.50
22	.60	.43
23	.43	.36
24	.50	.33
25	.43	.36

Table XIX.-

Vocabulary Item Reliability Indices

Item	Group I	Group II	Item	Group I	Group II
1	.517	.480	26	.515	.280
2	.524	.211	27	.401	.387
3	.484	.018	28	.462	.253
4	.544	.422	29	.306	.337
5	.650	.219	30	.687	.524
6	.248	.110	31	.475	.541
7	.535	.145	32	.529	.376
8	.450	.501	33	.258	.429
9	.510	.408	34	.508	.632
10	.263	.302	35	.138	.376
11	.375	.259	36	.307	.216
12	.395	.057	37	.503	.400
13	.486	.578	38	.378	.666
14	.529	.598	39	.286	.216
15	.454	.129	40	.514	.515
16	.424	.380	41	.462	.294
17	.316	.201	42	.228	.549
18	.380	.238	43	.503	.850
19	.545	.271	44	.275	.522
20	.298	.355	45	.427	.853
21	.600	.291	46	.579	.511
22	.454	.363	47	.307	.367
23	.492	.491	48	.462	.522
24	.341	.461	49	.628	.943
25	.400	.216	50	.393	.716

Table XX.-

Comprehension Items Reliability Indices

Item	Group I	Group II
1	.316	.513
2	.310	.252
3	.122	.348
4	.611	.350
5	.311	.150
6	.235	.240
7	.379	.091
8	.240	.299
9	.428	.733
10	.170	.303
11	.204	.633
12	.344	.177
13	.313	.149
14	.755	.289
15	.170	.480
16	.473	.254
17	.290	.629
18	.459	.348
19	.313	.309
20	.505	.430
21	.250	.358
22	.471	.536
23	.527	.619
24	.702	.683
25	.551	.619

APPENDIX 2

QUESTIONNAIRE AND DIRECTIVES TO PARENTS

APPENDIX 2(a)

QUESTIONNAIRE TO PARENTS

St. Vital School Division
25 September 1961

Dear Parents,

An experiment in the teaching of French will be conducted in the school which your child attends.

As your child may participate in this experiment, we would ask you to give us the following information:

1. Child's Name_____.
2. Date of birth_____.
3. Racial origin of father (e.g. English, German, French, Scottish, etc._____.
4. Racial origin of mother_____.
5. Has your child ever lived or associated with French-speaking people?_____.
6. Does your child ever listen to French radio or watch French television?_____.
7. Do you agree to your child's participation in this experiment?_____.

_____.
Parent's Signature

We wish to thank you for your cooperation.

Yours truly,

L. I. Masson

DIRECTIVES TO PARENTS

St. Vital School Division
2 October 1961

Dear Parents,

Your child _____ has been selected to participate in an experiment on the teaching of French in his school.

The experiment will start on October 16, 1961 and will be concluded on February 9, 1962.

During this period of time, we would ask you to ensure that your child does not listen to the French radio or watch French television. We would ask you to ensure also that you do not discuss the French lessons with him in any way. Finally, we would ask you to ensure that he does not associate with any French-speaking person during this period of time.

We wish to thank you for your kind cooperation.

Yours truly,

L. I. Masson

APPENDIX 3

THE TEST

APPENDIX 3(a)

THE VOCABULARY TEST

Directions: I am going to name some things and some people and I want you to point to them as I name them. Some of these things will be parts of your body and others will be things or pictures in this room.

1. Les cheveux
2. Le front
3. Le nez
4. Les oreilles
5. Les yeux
6. La bouche
7. Les joues
8. Le menton
9. Le cou
10. Les epaules
11. Les bras
12. Les mains
13. Les doights
14. Le ventre
15. Les jambes
16. Les pieds
17. Le cheval
18. La chaise
19. La table
20. Le plancher
21. Le mur
22. La porte
23. La fenetre
24. Le plafond
25. Le crayon
26. Le papier
27. La craie de couleur
28. Les ciseaux
29. Le pinceau
30. La robe
31. Les bras
32. Les souliers
33. Le toit
34. Le parfum
35. La pomme
36. Le radio
37. Le pain
38. Le lait
39. La maison
40. Le manteau
41. Le chapeau
42. La figure
43. Les gants
44. Le papa
45. La maman
46. Le garcon
47. La fille
48. La tete
49. Le chien
50. Le chat

THE COMPREHENSION TEST

Directions: I am going to say some words and I want you to do the action I say.

1. Marchez
2. Sautez
3. Chantez
4. Criez
5. Riez
6. Partez
7. Allez a la porte
8. Venez ici
9. Sentez le parfum
10. Touchez le mur
11. Lisez le livre
12. Donnez la main
13. Levez le pied
14. Assis
15. Debout
16. Levez les bras
17. Tournez les bras
18. Baissez les bras
19. Buvez le lait
20. Ecoutez le radio
21. Regardez par la fenetre
22. Asseyez vous sur la chaise
23. Montrez le plafond
24. Placez le pain sur la table
25. Comptez

APPENDIX 4

THE SAMPLE LESSON

APPENDIX 4

SAMPLE LESSON

Repeat previous lesson in its entirety.
Teacher (pointing to herself):
Je m'appelle Mme. Meyres
Je m'appelle Mme. Meyres
Je m'appelle Mme. Meyres
Comment vous-appelez vous?
Comment vous-appelez vous?
Comment vous-appelez vous?

Address this question to each student once.
Teacher (touching her hair):
Je touche mes cheveux
Je touche mes cheveux
Je touche mes cheveux

The teacher in turn touches her hair, her eyes, her mouth, her cheeks, her chin, her ears, her arms, her hands, her legs, her feet and in each case repeats three times: Je touche.....and awaits for students to say the word.

The teacher laughs aloud and says:
Je ris

This procedure is repeated three times and after each time the teacher says:
A vous maintenant
and waits for the students to carry out the action
The same procedure is carried out for the following:
1. Je crie
2. Je mange

Teacher (pointing to the model house):
Voici la maison
Voici la maison
Voici la maison

The teacher repeats the same procedure for each of the following:
1. Voici le toit
2. Voici le mur
3. Voici la fenetre
4. Voici la porte

The teacher says: "Debout" and then "Assis".
The teacher starts singing "Au Clair de la Lune".

APPENDIX 5

ABSTRACT OF

The Influence of Developmental Level upon the Learning of a Second Language Among Children of Anglo-Saxon Origin

APPENDIX 5

ABSTRACT OF

The Influence of Developmental Level upon the Learning of a Second Language Among Children of Anglo-Saxon Origin[1]

This study examined the influence of developmental level in the neurological sinse upon the learning of French among children of Anglo-Saxon origin.

As developmental level was expressed in terms of chronological age and as it was the variable, two groups of children of different chronological ages were selected. One ranged in age from five to six and the other from eleven to twelve. The groups were matched with regards to intelligence and ethnical background.

Both groups were subjected to comparable sessions of teaching in French over a four month period.

The tools of the experiment were two tests devised by the writer and based on the content of instruction. The Vocabulary test attempted to measure the extent of vocabulary gained by each group during the experiment and the Comprehension test attempted to measure the extent of comprehension of simple commands.

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1 Louis I. Masson, doctoral thesis presented to the School of Psychology and Education of the University of Ottawa, Ontario, April 1963, viii-74 p.

The tests as applied to the samples of the study proved to be sufficiently discriminative and sufficiently reliable to permit their acceptance as adequate measuring instruments.

The significance of the difference between the means of the two groups on each of the Vocabulary and Comprehension tests, served as inferential technique.

The results permitted the rejection of the hypothesis of no significant difference between the two groups. In the case of the toal tests as well as in the case of the Vocabulary and Comprehension tests, the younger group achieved significantly better than the older one.

It was concluded that children of Anglo-Saxon origin who are of above average intelligence and who are between the ages of five and six are likely to succeed better in French vocabulary and in French comprehension than those who are between the ages of eleven and twelve after both groups have been subjected to comparable periods of teaching in French.

It was implied that the teaching of French to Anglo-Saxon children of above average intelligence could advantageously be started at the kindergarten level.