

**COMPARISON OF BIRTH ORDER AND ACHIEVEMENT  
TEST SCORES OF FIFTH GRADE STUDENTS**

**BY**

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ACHIEVEMENT TEST SCORES OF FIFTH  
GRADE STUDENTS

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A Research Paper  
Presented to  
the Graduate Council of  
Austin Peay State University

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts

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by  
Janis Knod Tramill

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To the Graduate Council:

I am submitting herewith a Research Paper written by Janis Knod Tramill entitled "Comparison of Birth Order and Achievement Test Scores of Fifth Grade Students." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Psychology.

*Elizabeth H. Stokes*  
Major Professor

Accepted for the Graduate Council:

*William H. Ellis*  
Dean of the Graduate School

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## CHAPTER I

### INTRODUCTION

Early investigations of the effects of birth order on achievement of the individual traditionally have found the superiority of the first born and, to a lesser degree, the last born, in relation to the other places of birth. This phenomena was initially investigated in the 1800's by Sir Francis Galton (Altus, 1966). His findings indicated that there were more only sons and first borns among the eminent men of science than would be expected through mere chance happenings. He suggested that first borns, as well as the only child, would be in adult company for longer periods of time than any other birth order, and would be treated more as an adult and thus act accordingly. Later studies also found a greater proportion of first borns among eminent men and women (Altus, 1966). The younger child, as well, was favored over any other birth place, although not to the same degree as the first borns.

Apperly (as cited in Altus, 1966) in his study of Rhodes Scholars, discovered the first borns to be overrepresented and the youngest child to take precedence over the other places of birth. Similarly, Lewis Terman

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(as cited in Altus, 1966) discovered in his famous study of 1000 gifted children, that most of the children came from small families, and the greatest number were first born children, followed by the youngest child, and then the in-between child. Nicholas (as cited in Altus, 1966) found 60 percent of the 1618 National Merit Scholarship finalists in his sample were first born children. Within the first borns, he found that 66 percent were first born children in a two-child family; 52 percent were first born children in a three-child family; 59 percent were first born children in a four-child family; and 52 percent were first born children in a five-child family.

In studies on birth order and college enrollment, (Capra and Dittes, 1962; Schacter, 1963) it was found that 61 percent of the undergraduate sample at Yale were first born children; slightly over 50 percent at the University of Minnesota were first born children; and 66 percent at Reed College were first born children. Schacter (1963) has reported that at the graduate level, the first borns are also overrepresented.

In a study by Altus (1966) at the University of California, the first born children in the sample scored higher than later born children on tests measuring

verbal intelligence. Measures of quantitative ability, however, did not seem to be affected by birth order. Altus believes that first born children receive achievement training at home and because of this experience, might approach school situations more readily, work more diligently and persist longer in academic endeavors. It is this mode of approach to academic situations which tends to give the first born child a distinct advantage over later born children and could in turn increase their relative intellectual stature. His idea is that first born children are not necessarily superior to later born, but are more highly motivated to achieve accomplishments not obtained by their later born siblings. Burton, however, (1968) did find a very slight intellectual superiority of the first born children in her study comparing the birth order and intelligence of 43,352 high school seniors. These students were given a battery of tests in 1960 by Project TALENT. She concluded, however, that this difference was not of sufficient significance to explain the high achievement obtained by the first born children.

Altus (1966) felt that the relationship between first born children and achievement was due mainly to a verbal factor. Breland's (1974) research was an

attempt to explore the possibility of this verbal factor mentioned by Altus. This study involved 1817 National Merit Scholarship participants. The results of his study showed that first born children from small families had the highest scores and last born children from large families had the lowest scores. Kammeyer (1967) explained the verbal factor of the achievement of first born children as one in which the first borns play parent surrogate roles relative to the later born siblings. The first born child is sort of an "interlocutor" between parents and later born siblings which would enhance the development of verbal skills in the older child. Also, the isolation from the other siblings provides for a close relationship with parents at a higher verbal level and avoidance of close relationships with siblings at a low level. This initial isolation, followed by the interlocutor role, is suggested as an explanation for the superior verbal ability of first borns. (Breland, 1974).

Hunt (1961) feels there may be the possibility that first born children may enjoy a "richer" early environment in the form of intense parental stimulation of intellectual development. Other studies (Schacter, 1959; Sears, Maccoby, and Levin, 1957) suggested that the oldest child experiences parental pressures, which

might contribute to the development of personality traits which could facilitate performance in school. Schacter (as cited in Belmont, 1973) found that first born children had better school grades. He suggested this outstanding achievement could also derive from greater or different motivation and drive, higher intelligence, or even greater verbal aptitude. It is possible that the superiority of the first born children reflect the disadvantage of the later born children as well as the advantage of the first born children (Chittenden, Foam, & Zweill, 1968).

Otto (1965) suggested that the first born child would be either good readers or poor readers. They would strive to keep ahead which might either be productive and lead to success, or create uncontrollable anxiety with subsequent withdrawal from competition and ultimate failure. Anderson and Kelly's study (cited in Otto, 1965) of one-hundred poor and one-hundred good readers indicated that the oldest children in the group as well as the only child, tended to be better readers than children in any other positions. Twice as many of the oldest children were found in the group of good readers as in the group of poor readers. Farley, Smart, and Brittian (1974) did research which suggested a general picture of higher academic attainment

levels and more desired reading habits for first born children. It was stated that this may be due to a greater achievement motivation in first born children. They also suggested that there were other variables, such as special reinforcements and unique attention, which may have led to the higher level of academic achievement.

Bradley and Sanborn (1969) suggested that first born children obtain a higher level of intellectual achievement because they receive more opportunities for development than other children. According to Glass, Neulinger, and Brim (1974), first born children and only children are encouraged to higher aspirations and verbal skills, as compared to later born children. In addition, it was reported that there may be more parental concern about children's achievement and conformity for earlier than later born children. They also suggest that parents have less time for concentrated attention for later born children who spend more time in the company of and under the supervision of older siblings.

Zajonc (1976) emphasized that first born children are able to remain in an environment undiluted by the presence of an intellectually immature sibling if there

is a long birth interval between the first born child and other siblings. Thus, first born children have the advantage of being a member of a small family for a time. Older siblings, in addition, have the opportunity to act as teachers to their younger siblings. These first born siblings have the chance to teach the younger siblings motor skills and verbal skills in a variety of situations - how to hold a bat, how to skip a rope, how to tie their shoes, what new words mean. In addition, the older children will be able to see whether their explanations were well understood and will be prompted to improve the explanations, resulting in improvement of their own understanding. In this manner, first born children are able to be active participants in the intellectual process which is decidedly more instructive than being passive participants. Only children as well as the last born child, usually do not have the chance to serve as intellectual resources such as this.

Cattell (cited in Altus, 1966) felt that first born children enjoyed more eminence than later born children due to differential parental treatment, greater conscience development, greater dependence on adult norms, and higher expectations of achievement accorded these

children. It is suggested that it is this dependence upon adult norms, greater conscience development, and curiosity which may make first born children respond more affirmatively to the teacher, and to the school. Such behavior would more frequently win the approval of the teacher which would further encourage the child to do what is expected of a student.

Thus the evidence supports the theory that birth order has an effect on the mental abilities and achievement of students. It appears that the first born children have achieved more success in school than their siblings. However, there have been some conflicting results on the achievement of children other than the first born children. Much of the reported research has been with adults, college level, or high school students, rather than young children. It seems important to determine if there is a difference in the achievement of younger children of different birth orders. Both reading and arithmetic skills are basic academic skills, as achievement in other subjects is dependent on these skills. It thus appears to be important to determine if birth order affects the achievement of elementary children in reading and arithmetic.

### Purpose of the Study

The purpose of this study is to explore the effect of birth order on the Reading and Arithmetic Achievement Test scores of fifth grade children in a public school setting.

### Hypothesis

The following null hypotheses are tested:

1. There is no significant difference in the standardized Reading achievement scores of children who are first born, middle born, last born, or only children.
2. There is no significant difference in the standardized Arithmetic achievement scores of children who are first born, middle born, last born, or only children.

## CHAPTER II

### METHOD

#### Subjects

The subjects were selected from students in the Christian County School System, Hopkinsville, Kentucky. The students attended Booker T. Washington Middle School, where the Investigator was employed as a teacher. This school houses only fifth and sixth grade students. There are approximately 500 students, ranging in age from  $9\frac{1}{2}$  to  $12\frac{1}{2}$ .

In January, 1977, the entire student population were asked to take a questionnaire home for their parents to complete. This questionnaire explained the purpose of the study, and asked parents who would consent to having their children included in the study to list the names and ages of all the children in the family. The parents were informed in this questionnaire that the Investigator would be examining the achievement scores of all children whose parents completed and returned the form to the school. Over 300 students returned the forms. Of this number, 160 students were in the fifth grade. All 160 students on whom the data were returned were included in the sample.

The subjects were divided into four groups based on their birth orders as stated on the questionnaire: first, middle, last, and only. The middle children were defined as those who had older or younger siblings, without regard to the number of children in the family. There were 35 first born children, 58 middle children, 54 last children, and 13 only children.

### Instrument

The instrument used to measure the achievement of the subjects in Arithmetic and Reading was the Comprehensive Test of Basic Skills (CTBS), Level 2, Form S. The test was administered to all fifth grade students in March, 1977. The Comprehensive Test of Basic Skills is designed to measure the achievement of students in six basic skill areas: Reading, Language, Arithmetic, Reference Skills, Science, and Social Studies. The test was administered by the regular teacher as a part of the regular evaluation program.

The Total Reading and Total Arithmetic scores were the two scores examined. The Reading section is divided into two parts - Reading Vocabulary and Reading Comprehension. The scores on these parts are combined to achieve the Total Reading score. The Reading section

takes one hour and four minutes to complete with one break between the two parts. The Arithmetic section is also divided into two parts, Mathematics Computation and Mathematics Concepts and Application. The score on these two parts are combined to achieve the Total Mathematics score. It took one hour and twenty-six minutes to complete the entire Mathematics section, with one break between the two sections. The test was administered according to standardized procedures and was scored by hand by the classroom teachers at the completion of the entire battery.

### Procedure

The teachers reported the raw score, grade equivalent, and stanine for each student. The raw score for each student participating in the study was changed by the Investigator to Expanded Scale Scores using Table 5 of the Examiner's Manual. The Expanded Scale Scores are produced from a single, equal interval scale of scores across all grades for use with all levels of the Comprehensive Tests of Basic Skills. This score is expressed in three-digit numbers, ranging from 000 to 999. Comparisons may be made between groups tested and the standardization sample by using the Expanded Scale

Scores. The Scaled Score is recommended for research purposes.

## CHAPTER III

### RESULTS

Means and standard deviations were computed for the Reading scores for the first children, middle children, last children, and only children. These data are summarized in Table 1.

Table 1

Mean Scores and Standard Deviations  
for First Children, Middle Children,  
Last Children, and Only Children

Subjects	Reading			Arithmetic	
	N	$\bar{X}$	SD	$\bar{X}$	SD
First	35	501.91	88.61	466.77	59.56
Middle	58	401.38	82.75	405.84	73.02
Last	54	448.07	84.25	438.46	62.28
Only	13	458.69	86.24	436.69	53.69

Compared to the Normative group, the mean Reading score of the first children was at the 69th percentile, of the middle children at the 24th percentile, of the last children at the 45th percentile, and of the only

children at the 50th percentile. The norm group with whom the subjects were compared were 5th grade students in the last four months of the academic year who were in the normative sample.

The hypothesis of no significant difference in the mean Reading score among the four birth positions was tested by simple Analysis of Variance. These data are summarized in Table 2.

Table 2

Analysis of Variance for the  
Reading Score of the Four Birth Positions

	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Treatment	226445.91	3	75481.97	10.49*
Error	1122822.86	156	7197.58	
Total	1349268.77	159		

\* $p$  .05

The Analysis of Variance indicated a significant difference in mean reading scores,  $F(3,156) = 10.49$ ,  $p$  .05. The null hypothesis of no significant difference in the mean Reading scores of students having different birth positions in the family is rejected.

Further analysis using a two-tailed  $t$ -test was performed in order to determine where the differences existed. These data are summarized in Table 3.

Results from the  $t$ -tests show the mean Reading score of the first children was significantly higher than the mean Reading score of the last children,  $t(88) = 2.89, p < .01$ , and also significantly higher than the mean Reading score of the middle children,  $t(92) = 5.53, p < .01$ . However, there was no significant difference in the scores of the first children and the only children.

The mean Reading score of the last children was significantly higher than the mean Reading score of the middle children,  $t(111) = 2.96, p < .01$ . There were no significant differences in the mean scores of the middle children and only children, or the only children and last children.

Table 3

t-tests Comparing the Mean Reading and Arithmetic Scores  
of the Different Birth Positions

	<u>First born</u>			<u>Middle born</u>			<u>Last born</u>			<u>Only child</u>		
	<u>Read</u>	<u>Arith</u>	<u>df</u>	<u>Read</u>	<u>Arith</u>	<u>df</u>	<u>Read</u>	<u>Arith</u>	<u>df</u>	<u>Read</u>	<u>Arith</u>	<u>df</u>
First born	--	--	--	5.53**	4.17**	92	2.89**	2.13*	88	1.51	1.59	47
Middle born	5.53**	4.17**	92	--	--	--	2.96**	2.53	111	2.24	1.44	70
Last born	2.89**	2.13**	88	2.96**	2.53	111	--	--	--	0.41	0.09	66
Only child	1.51	1.59	47	2.24	1.44	70	0.41	0.09	66	--	--	--

\*p &lt; .05

\*\*p &lt; .01

Means and standard deviations were computed for the Arithmetic scores for the first children, middle children, last children, and only children. These data are summarized in Table 1.

Compared to the Normative group, the mean Arithmetic score of the first children was at the 67th percentile, the middle children at the 33rd percentile, the last children at the 52nd percentile, and the only children at the 51st percentile.

The hypothesis of no significant difference in the mean Arithmetic score among the four birth positions was tested by simple Analysis of Variance. These data are summarized in Table 4.

Table 4

Analysis of Variance for the Arithmetic Score  
of the Four Birth Positions

	<u>SS</u>	<u>df</u>	<u>MS</u>	<u>F</u>
Treatment	84460.40	3	28153.47	6.61*
Error	664753.97	156	4261.24	
Total	749214.37	159		

\* $p < .05$

The Analysis of Variance indicated a significant difference in Arithmetic scores of the four groups,  $F(3,156) = 6.61$ ,  $p < .05$ . The null hypothesis of no significant difference in the Arithmetic scores of students having different birth positions in the family is rejected.

Further analysis using a two-tailed  $t$ -test was performed in order to determine where the differences existed. These data are summarized in Table 3.

Results from the  $t$ -test show the Arithmetic score of the first children was significantly higher than the Arithmetic score of the middle children,  $t(92) = 4.17$ ,  $p < .01$ , and significantly higher than the mean Arithmetic score of the last children,  $t(88) = 2.13$ ,  $p < .05$ . There were no other significant differences in the Arithmetic scores of the four groups.

## CHAPTER IV

### DISCUSSION

The primary purpose of this study was to determine if there was a significant difference in the standardized achievement scores of students having different birth positions in the family. One hundred and sixty fifth grade students from Booker T. Washington School in Hopkinsville, Kentucky made up the sample for the study. All students were given the Comprehensive Tests of Basic Skills as a part of their regular educational program. The mean Reading score and the mean Arithmetic scores were compared to determine if there were significant differences in the scores of children with different birth positions in the family.

The data showed that the mean standardized Reading score of the first born children was significantly higher than the mean Reading score of the middle born and the last born children. The mean Reading score of the last born children was significantly higher than the mean Reading score of the middle children. There was no significant difference in the mean Reading score of the only children in comparison to all other birth positions.

The mean Arithmetic score of the first born children was significantly higher than the mean Arithmetic score of the middle and the last children. No other significant difference was found between the mean Arithmetic scores of the other birth positions.

The results of this study support the previous research suggesting that first born children are academically more successful in school achievement. The children who scored lowest on the achievement tests in both Arithmetic and Reading are the middle children. The achievement of the only children and the last children fall between the first and the middle children in both Reading and Arithmetic. Both the first and the last children had higher Reading scores, but only the first children had significantly higher Arithmetic scores as well. This study also indicated that the only children, while being neither significantly above or below any of the other birth positions, are similar to the last born children as suggested by Zajonc (1976). In addition, the results of this study also are consistent with the findings of Altus (1966) indicating that more first born achieve eminence than would be expected from mere chance happening.

Recommendations for further research

Research is limited in the area of achievement and birth order of elementary school age children. Further research is needed at all levels of the elementary level to determine if birth order affects achievement. Additional research can be expanded to comparing birth order with the sex of the individual and achievement; birth order and the number of children in the family; and birth order, achievement, and the spacing of the children in the family.

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