

A COMPARISON OF TWO SCHOOL AGE POPULATIONS
 IN THEIR RESPECTIVE RATES OF PERCEPTION OF REVERSALS IN
 DYNAMIC LISSAJOU FIGURES

by Brother Osmund

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Perception offers a rich and broad field of exploration for contemporary psychologists. Since it first received official recognition in the days of Wundt, it has progressively expanded both as a theoretical and an operational concept, to include an extensive area in modern psychology. Varying, as it does, in meaning from "interpretative and evaluative response" to "the whole of phenomenal experience at a given time" and from "psychic reproduction of objects" to "combining sensations from raw materials" ¹ it furnishes the basic principles for such widely varied areas as social psychology and the design and interpretation of projective techniques.

One of the most interesting recent developments in the study of perception is the widespread concentration of research on the relationships between perception and personality. This is indicated by the content of contemporary psychological journals some of which are almost entirely centred on this theme. The hypothesis advanced in the present study centres upon this relationship.

The experimental part of the study is directed towards investigating a developmental aspect of perception considered in its "visual recognition" meaning. The hypothesis seeks to explain the results of the experimental work.

¹ These are some of the meanings that R. B. Ammons considers as accepted by psychologists.

CHAPTER I

LISSAJOU FIGURES AS REVERSIBLE PERSPECTIVE PATTERNS

1.- Meaning of Reversible Perspective.

There is a wealth of modern experimental literature on Perception, utilizing many different procedures and varied concepts. Among the recent experimental techniques is the use of dynamic Lissajou figures in tests calling for reversible perspective patterns.

Since dynamic Lissajou figures constitute an example of the phenomenon of reversible perspective, it is important, in view of the present research, that the position of reversible perspective in the general field of perception be clearly established. This presents some difficulty owing to the fact that the term "Perception" itself, though a key concept in contemporary psychology, is used with a wide variety of meanings. One solution to this difficulty has been offered by R. B. Ammons in a summary of fifteen general meanings of the term, as used in current psychological literature¹. One of the meanings he lists is "Recognition response", which is subdivided into thirteen operational definitions. Reversible perspective is one of these operational definitions. According

¹ R. B. Ammons, Experiential Factors in Visual Form Perception: Review and Formulation of Problems, in The Journal of Genetic Psychology, Vol. 84, 1954, p. 3-25.

to the author, "A picture of reversible perspective is shown and S is asked which orientation he recognizes".

As the term implies, this type of perceptual pattern is characterized by reversals in the design. In the traditional static figures, such as the various cube and staircase designs, the figure remains physically motionless while under observation but there is an apparent shift between a sector or a set of sectors in the design and what might be termed the background, or, more technically, the "ground". In other words the observer sees two or more different arrangements of the figure as a result of the apparent transfer of visual emphasis from the sector or set of sectors to ground and vice versa. These apparent shifts in the design are termed reversals.

2.- Advantages of Dynamic Figures

During the past ten years some psychologists have been using a new type of experimental procedure in which the traditional static figure is replaced by a dynamic Lissajou figure, in studies involving reversible perspective phenomena. According to Osgood the dynamic Lissajou figure is "a revolving, abstract design, reversible in direction of apparent movement"². It is readily composed and projected on the screen of a cathode ray oscilloscope.

² Charles E. Osgood, Method and Theory in Experimental Psychology, New York, Oxford University Press, 1953, p.221.

Dynamic figures, as test patterns, seem to present several advantages over static figures. They are particularly advantageous when working with subjects such as children or psychotics. In such cases the problem of sustained attention is a major one for the experimenter and the moving figure is much more captivating than the static one. In the present study it was noted that young children outwardly expressed reactions indicative of strong fixation of interest, even after several minutes of observing.

Another advantage of the Lissajou figure is the ease with which the design may be controlled and varied for such factors as complexity of pattern, shape, speed of rotation, illumination and focussing.

It also seems to introduce, in compelling form for some observers, two additional types of movement called "rinsing" and "accordion" movements, respectively. These visual recognition phenomena have hitherto been seldom reported.

3.- Use of Dynamic Figures in Perceptual Studies

The first recorded investigation of reversible perspective phenomena, as exhibited in revolving Lissajou figures, was a study of some of the variables associated with the projection of these figures. The investigation was conducted

by Philip and Fisichelli³. The main conclusions of their study were:

1. That the rate of perception of reversals increased with an increase in speed of rotation.

2. That the rate of perception increased with increasing complexity of pattern. Subjects reported more apparent reversals when observing a six element figure, for example, than when observing a four element figure.

3. That the rate of perception increased with the amount of time spent observing, when short rest periods were introduced, in some cases.

4. That varying the height-width ratio of the design resulted in an increase in the number of movements other than reversals, i.e., of "rinsing" and "accordion" movements.

A further research on the influence of mental set on the rate of perception of reversals was carried out by Fisichelli, with a dynamic Lissajou design⁴. Fisichelli concluded that the rate may be increased by internal motivation; by desiring to see more reversals the subject's rate of perception increased.

3 B.R. Philip and V.R. Fisichelli, Effect of Speed of Rotation and Complexity of Pattern on Reversals of Apparent Movements in Lissajou Figures, in American Journal of Psychology, Vol. 58, 1945, p. 530-539.

4 V.R. Fisichelli, An Experimental Study of Some Factors Involved in the Fluctuations of Ambiguous Perspective Figures, (Unpublished Doctoral Dissertation), Fordham University, New York, 1948.

Another study, completed by Philip⁵, consisted of a comparison of the frequency of perception of reversals by two psychotic groups observing dynamic figures. He noted that reliability based on test-retest for psychotics is higher for the Lissajou figures than it is for static cube outline test patterns. By comparing his results with data from preliminary experiments and with results obtained by other experimenters from non-psychotic groups he concluded that normals have a higher reversal rate per minute than psychotics.

McMurray studied the perception of reversals by a group of feeble-minded children, using Lissajou figures⁶. He found that their perception rate was lower than that of normals.

4.- Object of This Research.

The present study, a comparison of two school-age groups in their respective rates of perception of reversals in dynamic Lissajou figures, is directed towards the developmental aspects of this type of visual recognition. It appears that no investigations of this nature have yet been carried out, and it seems to be of some importance to determine whether or

⁵ B.R. Philip, Reversals in the Perception of Lissajou Figures by Psychotics, in Canadian Journal of Psychology, Vol.7, 1953, p. 115-125.

⁶ J.G. McMurray, Visual Perception in Exogenous and Endogenous Mentally Retarded Children, in American Journal of Mental Deficiency, Vol.58, 1954, p. 530-539.

not age is a factor in the recognition responses obtained from the observation of apparent⁷ reversals in such test patterns. Specifically, is there a significant difference between the respective rates of perception of subjects in two different age groups of normal children of school age, as evidenced from their reported observations of reversals in dynamic Lissajou figures? The study includes the problem of advancing a hypothesis that attempts to explain the results of the experiment.

⁷ The word "apparent", as used in this study, emphasizes the fact that these reversals are not real, in the physical sense of the word "reversal". They are, seemingly, dependent in their frequency, upon subjective, psychological factors in the observer.

CHAPTER II

METHODOLOGY OF THE EXPERIMENT

1.- The Test Pattern.

In this experiment a 240-cycle signal from an audio generator was combined with the 60-cycle frequency of the line voltage, on the screen of a cathode ray oscilloscope. This results in a four-loop, composite design which is regulated, by slight adjustments of the dial controlling the 240-cycle signal, to a frequency of seven or eight apparent revolutions per second¹. By proper control of the vertical and horizontal gain controls, the size of the design was carefully set to equality of width and length, with the extremities of the loop touching the edges of a square with sides approximately five inches in length. The intensity of illumination and the focussing were adjusted to the convenience of each subject, individually.

2.- The Population Tested

The subjects for this test were 100 pupils of St. Patrick's School, 61 DeSalaberry Avenue, Quebec City. This school presented a particularly choice selection of subjects from the viewpoint of simplifying the controls that ordinarily

¹ Choice of a suitable frequency, and of settings for other controllable factors, was based on the studies of Philip and Fisichelli.

have to be exercised in getting an ideal representation for the problem to be investigated. It is the only school in Quebec City for English-speaking Catholics. It is, therefore, representative of a wide range of socio-economic and cultural home conditions. The student body presents an extraordinarily broad selection, too, from the standpoint of mental ability. There are no facilities in the city for English-speaking boys whose mental ability and aptitudes would ordinarily warrant their being placed in opportunity classes, in trade schools or other such special curriculum institutions. St. Patrick's School tries to adjust its curriculum and its promotion system to accomodate many of these cases; it is, thus, well represented by students in the full range of mental ability classifications that come in the general category of "normals".

Two groups, comprising fifty subjects each, were chosen at the ten and fifteen year old age levels, respectively. Preliminary tests indicated doubtful reliability of results obtained from subjects under the age of ten, due chiefly, it seems, to the difficulty experienced by children of this age in understanding instructions. The age of ten² was, therefore, chosen to include the younger subjects. The older group was chosen somewhat arbitrarily, though partly in view of the fact

² "The age of ten" means nine and a half to ten and a half years old. The age "fifteen" has a similar interpretation.

that this age group presented approximately the correct number of subjects and also represented a significant difference, as an age group, from the ten year olds.

Grades Three, Four, Five and Six of St. Patrick's School supplied the ten year old subjects. There were actually fifty-two in this age group. One was left out as a result of his being incapable of grasping and following instructions; another seemed to be too nervous to go through the testing programme with any promise of reliable reporting.

Forty-seven fifteen year old subjects were available in Grades Seven, Eight, Nine and Ten. This group was completed by the addition of three students from the Commercial Academy of Quebec.

3.- Experimental Procedure

Each subject was tested separately at about three o'clock in the afternoon. Prior to the testing the experimenter conducted a brief interview for the purpose of attempting to reduce any emotional stresses under which the subject might be labouring. After the interview the figure was projected on the screen and the observer was seated fifteen feet away with eye-level at approximately the centre of the revolving test pattern. Instructions for reporting on the apparent movements were given as follows:

On the screen in front of you there is a sort of picture. Do you see it? What is it doing? Is it turning? Which way? Point out the direction with your hand. Now watch it for a while and see if it does anything else. (In all cases reversals in direction were reported). Every time it changes point out the direction with your hand. (Arbitrary rights and lefts were chosen according to the orientation reported by the observer).

There are two other things this picture may do and I want you to tell me whenever you see them. (Here the "rinsing" and "accordion" movements were demonstrated by varying the horizontal and vertical gain controls, respectively, to a minimum). You may not see either of these things but, if you do, be sure to tell me by saying "rinsing" or "rolling" for one and "accordion" for the other. Now look at the screen for a while and see if you notice either of these movements.

Now look away from the screen for a while to rest your eyes. In about half a minute I am going to click this stop watch which means that you will begin telling me what you see. You may use your right hand to point out the direction, calling "left" or "right" while pointing. After one minute I will click the watch again and you will stop for a little rest. Then we will begin over again and finish ten minutes of observing the moving figure. Be sure to tell me exactly what you see or your score will be spoiled. It doesn't matter whether you see only a few changes or a great many. The important thing is to tell me exactly what the picture is doing.

Do you want to ask any questions? All right. Look at the screen now and when you hear the click, start telling me what the picture is doing.

With lights dimmed in the room the experimenter sat to one side and slightly to the rear of the observer and the experiment began. The first minute was taken as pre-test practice and was not recorded officially. All perceptions indicated, after the one minute pre-test, were recorded. At the end of each minute the observer was given about twenty

seconds rest, with his eyes off the pattern.

All subjects gave excellent cooperation; the majority were even enthusiastic about taking part in the experiment. A large number wished to know the purpose of the experiment. So as to avoid furnishing undesirable motivation, which might result in exaggerating the number of apparent movements observed, no specific information was given, in answer to these inquiries. The answer "We are studying this type of picture and we want you to help us by telling us exactly what you see it doing", seemed to satisfy practically all inquirers.

Re-tests were conducted three months after the original testing. The complete results are given in Chapter III.

CHAPTER III

ANALYSIS OF THE DATA

1.- Method of Scoring

The total number of reversals reported by a subject during the ten minutes of testing was taken as his score. This method of scoring seems warranted in view of the fact that the testing period was in reality of ten minutes duration, the brief rest periods being purely incidental. According to the original plan the observer was supposed to watch the figure and report, without interruption, for ten minutes. Obvious fatigue and strain, exhibited by observers during pre-test practice, necessitated the introduction of the rest periods.

All of the subjects tested perceived reversals. The majority of the ten year old subjects saw more than one hundred during the ten minutes. The mean score for this group, as for the older group, is the average number of these apparent movements reported for the ten minute period. Raw scores for all movements appear in Appendix I.

2.- Analysis of the Reversals Scores

The main object of this research is to determine whether or not there is a significant difference between the

two age groups in their respective rates of perception of reversals in Lissajou figures. Since the individual testing of 100 subjects involved a considerable amount of time, a preliminary Wilcoxon non-parametric test for significance of difference of means in unpaired replicates was applied to the results obtained from the first twenty subjects tests, ten from each age group. The purpose of administering this test was to get some idea of the way the experiment was progressing in the early stages. In the Wilcoxon test, total ranks for the ten year old and for the fifteen year old subjects were, respectively, 69 and 141. For a rank total of 69 the value of P is approximately 0.005. (P.01 equals 71; P.02 equals 74, when N is 10.) This significant difference was an encouragement to carry on the experiment on a larger number of subjects.

Wilcoxon test data are given in Appendix II. The t-value eventually obtained from the complete results confirmed this preliminary measure of variance. Table I gives the statistics of the final data.

The t-value, 6.59, is of unquestioned significance since, at the one per cent level of probability, the critical value is 2.62. It may therefore be stated that, on the basis of this study, there is a significant difference between the rates of perception in the two groups tested.

TABLE I.- The t-test of Significance in Comparing the Mean Number of Reversals in the Two Age Groups.

Statistic ¹	Ten Year Old Group	Fifteen Year Old Group
Number of Subjects	50	50
Number of Reversals	5501	2967
Mean	110.02	59.34
σ	42.33	33.20
σ_M	6.05	4.75
Difference Between Means		50.68
σ_D		7.69
t-value		6.59

1 Calculations were made from the formulae:

$$\sigma = \frac{1}{N} \sqrt{N \sum X^2 - (\sum X)^2}$$

$$\sigma_M = \frac{\sigma}{\sqrt{N-1}}$$

$$\sigma_D = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2}, \quad \text{where } M_1 \text{ and } M_2 \text{ are the two means.}$$

$$t\text{-value} = \frac{M_1 - M_2}{\sigma_D}$$

The results were tested for reliability of scores both with odd-even and with test-retest techniques. The obtained coefficients are given in Table II. The reliability in both cases is adequate.

3.- Secondary Objects of Research

One of the secondary objects of this study is to find out whether or not there is evidence of learning in this type of perception¹. For this purpose it was decided to group the first three minutes of observing and the last three, respectively, for each subject tested, and to carry out a statistical analysis of the results as indicated in this grouping. Table III gives a summary of this analysis.

In the younger group, the relatively wide disparity of means suggests that learning affected the rate of perception of reversals in a positive manner. In other words, the younger subjects saw an increasing number of reversals per minute with increase in length of time observing.

In the older group, on the other hand, the relatively insignificant difference in means seems to preclude the possibility, in so far as these results are concerned, of learning affecting the perception rate. The coefficients of

¹ Learning is broadly defined here as change in performance as a result of repetition.

TABLE II.- The Reliability of Scores.

	Ten Year Old Group	Fifteen Year Old Group
Odd-Even	.91	.79
Test-Retest	.93	.90

TABLE III.- Comparison of the Number of Reversals Reported During the Initial Three Minutes With the Number reported During the Final Three Minutes.

	Ten Year Old Group		Fifteen Year Old Group	
	Initial	Final	Initial	Final
Mean	31.7	35.8	17.8	17.5
σ	14.9	10.3	12.3	11.2
σ_M^1	2.1	1.5	1.8	1.6
Correlation ²		0.35	0.79	
σ_D^3		2.11	2.13	
t-value ⁴		1.89	0.14	

1 σ_M was calculated from the formulae: $\sigma_M = \frac{\sigma}{\sqrt{N-1}}$

2 Correlation, r, was calculated from:

$$r = \frac{N\sum XY - \sum X \cdot \sum Y}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

3 σ_D was calculated from: $\sigma_D = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r\sigma_{M_1}\sigma_{M_2}}$

4 Required t-value at P.01 = 2.62.

correlation might possibly be a confirmation of this conclusion. There is a decidedly lower correlation between the rates at the beginning and at the end, in the younger group, while in the older group the correlation is high.

A simple graphical analysis of the changes in perception rates, with increase in time of observing, was made. Though it does not necessarily give an accurate representation of the presence or absence of learning, it does give a general idea of the increase or decrease in the relative rates for the two groups. While there is, seemingly, a rise in the rate with increase in time of observing, in the case of the younger group, the graph for the older group indicates no such rise². The graphs appear in Appendix III.

Another secondary object of this study is to investigate movements other than reversals. As mentioned in the details of experimental procedure, each subject was asked to declare all movements observed, apart from continuous rotation in one direction. The data on the two other types of movement observed, "rinsing" and "accordion" movements, appear in Table IV. The data seems to justify the following conclusions:

² The decided difference in means for the first three minutes in the two respective groups precludes the possibility of the over-all difference being the result merely of learning.

TABLE IV.- Frequency of Rinsing and Accordion Movements.

	Ten Year Old Group		Fifteen Year Old Group	
	Rinsing	Accordion	Rinsing	Accordion
Total Number	132	520	199	450
Percentage ¹	2.11	8.45	5.50	12.44
Mean	2.64	10.40	3.98	9.00
Number of Subjects Reporting	13	26	20	31
Percentage of Subjects Reporting	26	52	40	62

¹ The percentage here is taken on the total of all the movements reported in the group.

1. As compared with the frequency of reversals, the number of apparent rinsing movements is small.

2. Since about half the total number of subjects reported accordion movements, and since the latter constitute over 10 per cent of the total number of movements observed, it seems that they are of sufficient importance to deserve further attention.

3. A simple inspection of Table IV seems to indicate that the older group had a higher rate in the perception of rinsing and accordion movements. Whether or not the difference between this rate and that of the younger group is significant could best be determined by a separate study of these two types of movement.

An over-all examination of the raw scores revealed the fact that there is no consistency between high scores on reversal movements and high scores on either of the other two types of movement, or between the former and the total of the two latter.

CONCLUSIONS AND HYPOTHESIS

1.- Conclusions

With a view to determining whether or not there is a significant difference in rate of perception of apparent reversals in dynamic Lissajou figures, between two school-age populations, one hundred subjects were tested. The age levels selected for the two groups were ten and fifteen years, respectively. These levels were chosen somewhat arbitrarily though the choice was considerably influenced by certain limiting factors such as those mentioned in Chapter II. Since this study is an inquiry into a developmental aspect of visual recognition, what was considered a representative difference in chronological age was allowed¹.

The computed t-value for the frequencies of perception of reversals in the two groups was 6.59. It may therefore be stated that, on the basis of this study, ten year old boys in a school population that may be classified as "normal"², have a higher rate of perception of reversals in dynamic Lissajou figures than fifteen year old boys in the same category of population.

¹ Taking into account some of the teachings of developmental psychology, a five year difference in age from the lower limit selected, was considered to represent a real developmental difference.

² "Normal" is used here in the general sense of the term as excluding "delinquent" and "mentally deficient" cases.

There were two secondary objects in this research:

1. To inquire into the possibility of learning entering into this type of perception.

2. To investigate other movements besides reversals.

The results suggest that learning did affect the rate of perception in the younger group but not seem to enter into that of the older group.

With regard to movements other than reversals, rinsing movements constitute just slightly more than 3 per cent of the total number of movements as contrasted with approximately 87 per cent for the reversals. The rinsing movements do not seem, therefore, to merit further attention.

Accordion movements constitute approximately 10 per cent of the total number of movements and more than 50 per cent of the subjects reported them. They seem to constitute one of the accepted phenomena of reversible perspective and deserve further study.

2.- Hypothesis

Developmental psychologists often state, either implicitly or explicitly, that younger people show greater plasticity than do older people. This statement seems to be based on general considerations related to the process of maturation. The experimental evidence for it is, however, sparse.

The hypothesis here advanced is that younger children in school populations that may be classified as normal, have a higher rate of perception of reversible perspective phenomena than do older children, as a result of their greater plasticity.

The term "plasticity", as used in psychology, implies a capacity of the organism to organize, with some facility, new inter-neural connections so that the neural discharges can follow different paths. It might also be explained as the converse of "rigidity", a familiar term in psychological literature, though still vaguely defined. As is the case with plasticity, the criteria for its evaluation are decidedly indeterminate. It is, however, of more frequent occurrence in literature than plasticity. It is associated with a progressive decline in adaptability of the personality to changing environment and, in general, to the reception of new impressions and ideas. In these terms plasticity is associated with resiliency of personality resulting in adaptability to changes and in a receptive attitude with regard to new impressions.

This hypothesis rests on the conclusion that chronological age was the principal effective agent among the factors that can be held responsible for the difference in the perception rates of the two groups.

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Philip, B.R., Reversals in the Perception of Lissajou Figures by Psychotics, in Canadian Journal of Psychology, Vol. 7, 1953, p. 115-125.

Psychotics, as compared with normals, tend to have a lower rate of perception of reversible perspective.

Philip, B.R. and Fisichelli, V.R., Effect of Speed of Rotation and Complexity of Pattern on the Reversals of Apparent Movements in Lissajou Figures, in American Journal of Psychology, Vol. 58, 1945, p. 530-539.

Speed of rotation and complexity of pattern each affect the rate of perception of movements in Lissajou figures. The rate of perception increases directly with increase of speed of rotation and with increasing complexity of pattern.

APPENDIX I

Raw Data on Movements Reported

TABLE V.- Raw Data Consisting of Totals of Each Type of Movement¹ Observed, Totals Being For Ten Subjects at a Time¹.

TEN YEAR OLD GROUP				FIFTEEN YEAR OLD GROUP			
Reversals Rinsing Accordion				Reversals Rinsing Accordion			
			<u>Total</u>				<u>Total</u>
1304	17	80	1401	714	26	77	817
878	3	109	990	526	58	126	710
1266	13	78	1357	704	19	23	746
1092	59	144	1295	435	14	68	517
961	40	109	1110	588	82	156	826
5501	132	520	6153	2967	199	450	3616

¹ Ten subjects from each of the two groups were tested each week and, for purposes of convenience and comparison, the scores were kept in groups of ten. Each set of horizontal scores represents, therefore, the results for one of the five weeks required to complete the experiment.

APPENDIX II

Data For Wilcoxon Test

TABLE VI.- Data For the Wilcoxon Non-parametric Test for Significance of Difference of Means in Unpaired Replicates.

TEN YEAR OLD SUBJECTS ¹					FIFTEEN YEAR OLD SUBJECTS				
Rev. ²	Rin.	Acc.	Total	Rank	Rev.	Rin.	Acc.	Total	Rank
148	3	0	151	3	48	0	0	48	17
85	3	0	88	13	25	1	0	26	20
150	0	0	150	4	43	8	0	51	16
153	0	0	153	2	53	0	3	56	15
142	0	0	142	5	139	0	0	139	6
114	6	0	120	9	36	0	6	42	18
115	0	0	115	11	102	10	0	112	12
74	0	2	76	14	109	0	12	121	8
134	1	3	138	7	34	0	0	34	19
154	0	0	154	1	115	0	2	117	10
RANK TOTAL				69	RANK TOTAL				141

1 The total number of movements for this group of ten subjects does not correspond with any of the totals for the five groups in Appendix I because two of the subjects used in this preliminary test were from the second group. This was due to the fact that, as a result of a school attendance problem, the first group could not be completed as scheduled.

2 Abbreviations: Rev. for reversals; Rin. for rinsing; Acc. for accordion.

APPENDIX III

Graphs of Perception Rates Per
Minute in Each Group

APPENDIX III

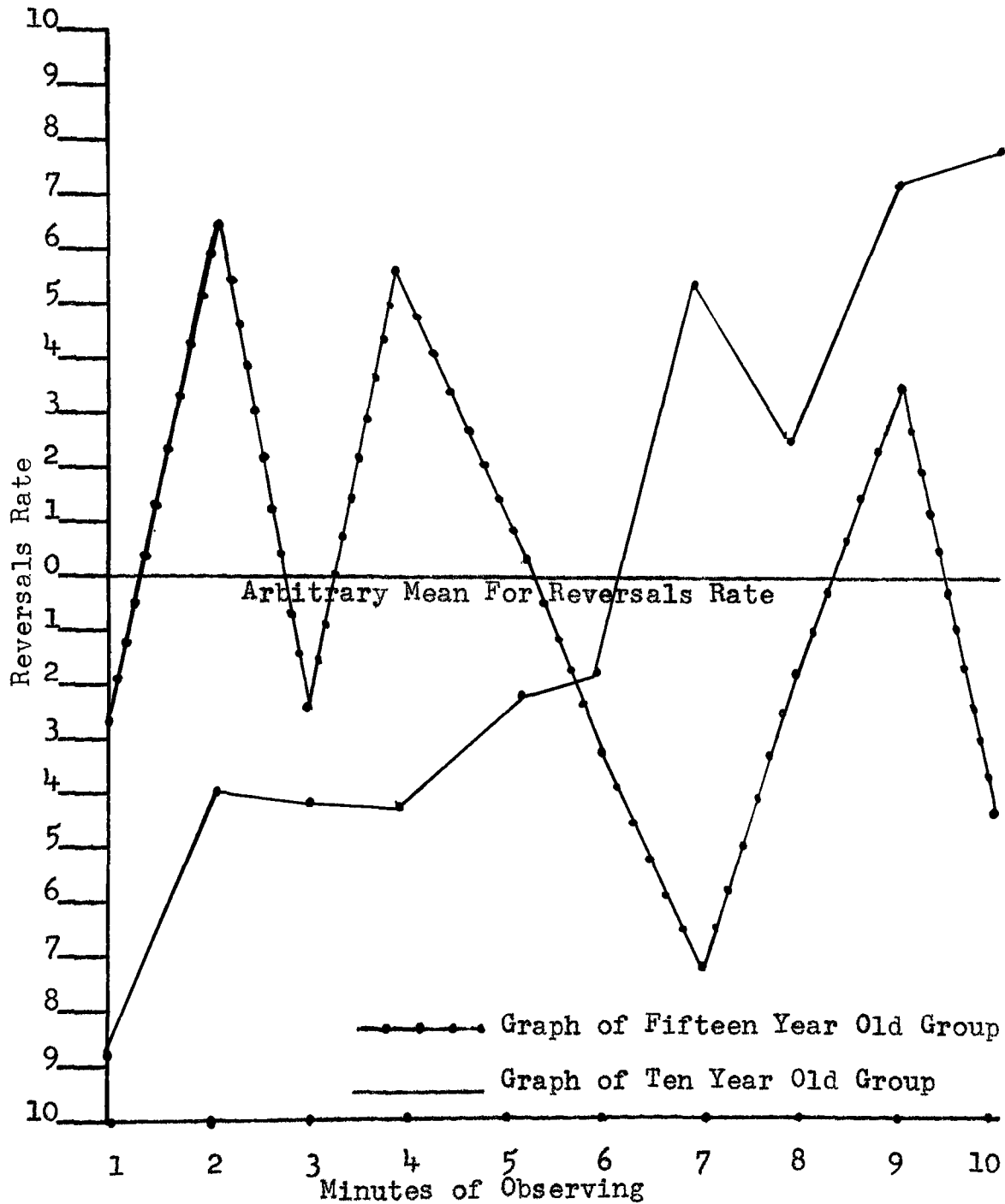


Figure 1.- Graphs of the frequencies of reversals per minute in the two groups. Ordinates are arbitrary units proportional to the rise and fall of the rate above and below the mean.

APPENDIX IV

An Abstract Of

A Comparison of Two School Age
Populations in Their Respective Rates of
Perception of Reversals in Dynamic Lissajou Figures

AN ABSTRACT OF

A Comparison of Two School Age Populations in Their Respective Rates of Perception of Reversals in Dynamic Lissajou Figures¹

In order to determine whether or not there is a significant difference between two school age groups of normal children, in their respective rates of perception of reversible perspective phenomena, a ten year old and a fifteen year old group were tested. A recently developed technique, which consists in composing dynamic Lissajou figures on the screen of a cathode ray oscilloscope as a test pattern, was invoked in this experiment.

Fifty subjects from each age group were tested. The test consisted in observing a four-loop, revolving figure, for a period of ten minutes, with a break of a few seconds after each minute of observing. Subjects were asked to report movements other than reversals, besides the latter.

The computed t-value between the rates of perception of reversals in the two groups was 6.59, which means that there is a significant difference in rates.

The frequency of rinsing movements was considered too low to warrant further attention. Accordion movements

¹ Brother Osmund, A Comparison of Two School Age Populations in Their Respective Rates of Perception of Reversals in Dynamic Lissajou Figures, M.A. thesis presented to the Institute of Psychology of the University of Ottawa, Ottawa, 1956, vi-32 p.

constituted more than ten per cent of the total number of movements reported, and seem to deserve further study.

An inspection of the raw scores revealed the fact that there is no consistency between high scores on reversals and high scores on either of the other two types of movement, or between the former and the total of the two latter.

An inquiry was made into the possibility of learning affecting the rate of perception in this type of visual recognition test. The results of the first three minutes were compared with these of the last three minutes of the ten minute period. A t-value of 2.7 from Means of 31.7 and 35.8, for the first and the last three minutes, respectively, indicates the possibility of learning affecting the rate in the case of the younger group. The results for the older group indicate that learning did not seem to affect the rate of perception.

An attempt was made to explain the results of the main object of the research.