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I hereby recommend that the thesis prepared under my supervision by Maurice Newburger entitled The Importance of Difficulty and Homogeneity as Factors in the Development of Mental Fatigue at Two Different Levels of Intelligence be accepted as fulfilling this part of the requirements for the degree of Doctor of Philosophy

Approved by:

Arthur G. Pills

THE IMPORTANCE OF DIFFICULTY AND HOMOGENEITY
AS FACTORS IN THE DEVELOPMENT OF MENTAL
FATIGUE AT TWO DIFFERENT LEVELS OF INTELLIGENCE

A dissertation submitted to the
Graduate School
of the University of Cincinnati

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requirements for the degree of

DOCTOR OF PHILOSOPHY

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by

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TABLE OF CONTENTS

1. Introduction	Page 1.
2. Problem	" 6.
3. Definitions	" 7.
4. Subjects and Conditions of the Experiment	" 8.
5. Preliminary Procedure	" 8.
6. Photograph of Apparatus	" 9.
7. Wiring Diagram of Apparatus	" 9.
8. Discussion of Apparatus	" 17.
9. Experimental Procedure	" 18.
10. Results	" 19.
(a) Experiment 1 - Superior Group	" 20.
(1) Work Curves of Homogeneous and Heterogeneous - Easy Problems	" 21.
(2) Work Curves of Homogeneous and Heterogeneous - Difficult Problems	" 22.
(3) Table 1 - Coefficient and Fatigue Problems per Minute	" 24
(4) Table 2 - Coefficient of Fatigue - Errors per Problem per Minute	" 24
(b) Experiment 2 - Normal Group	" 26
(1) Table 1 - Coefficient of Fatigue - Problems per Minute	" 27
(2) Table 2 - Coefficient of Fatigue - Errors per Problem per Minute	" 27
(3) Work Curves of Homogeneous and Heterogeneous - Difficult Problems	" 28
(4) Work Curves of Homogeneous and Heterogeneous - Easy Problems	" 29
11. Summary and Conclusions	" 31
12. Interpretation and Discussion	" 32
13. Bibliography	" 35
14. Appendix	" 36

Introduction

The present study is concerned with the determination of the relative importance of difficulty and homogeneity as factors which influence the development of mental fatigue in individuals of superior intelligence and in others of normal intelligence.

A review of the reports of work done in the field of work and fatigue, indicates that the earliest studies were concerned with the fatigability of extirpated muscles of the lower vertebrates. The first of these was conducted by Kronecker as early as 1870, when he experimented with the gastrocnemius muscle of the frog. His results led to the conclusion that the curve of a muscle stimulated at regular intervals with equally strong induction shocks could be represented by a straight line and that the height of the contractions diminished more rapidly as the rate of stimulation was increased.

Probably as a result of the investigations in muscle fatigue in animals, Mosso sought for some method of studying muscle fatigue in man and invented a device which he called the ergograph and with the aid of which he made possible a new approach to the problem of work and fatigue. He not only showed that the work curve of the intact human muscle could be studied but discovered, as well, that when a muscle had become so fatigued by continuous voluntary contractions that further effort failed to elicit a re-

sponse, the introduction of electrical stimulation causes the muscle to contract again. As a result of his investigations, Mosso pointed out the possibility of inferring intellectual fatigue by the measurement of its effects upon muscular ability. It is very likely that this belief played an important part in the later studies in which definite correlation between mental and physical fatigue has been attempted.

As an outgrowth of the distinction between, and the correlation of, mental and physical fatigue, a number of theories have been developed in an attempt to distinguish between physical and mental work. Thorndike has offered the theory that mental work is work of the nervous system alone; while physical work is work of the muscles and sense organs. Watson, on the other hand, maintains that mental work involves activity of the finer skeletal muscles and that physical work involves activity of the gross muscles of the body. Bills believes that "the most satisfactory answer is that the distinction between physical work and mental is purely one of degree; the former involving relatively more use of the gross muscles and the latter involving relatively more use of the nervous system."

Woodworth recognizes an analogy between physical and mental work and, on this basis, he attempts to translate a formula for the former into one for the latter. He accepts the

formula, $\frac{1}{2} M V^2$, where M refers to mass and V to the distance divided by time, as being satisfactory for physical work and believes that mass may be paralleled by difficulty, in mental work, and that velocity may be paralleled by the amount of mental work done in a given time. Upon the basis of the fact that the movement of a mass may result in physical fatigue, he assumes that difficulty of mental work should result in mental fatigue. Likewise, the rate of the movement may influence the development of physical fatigue and the amount of mental work done in a given time may influence the development of mental fatigue. From Woodworth's reasoning, the logical development of the principle of difficulty, as a factor in the work decrement may be traced. The author of the present work is not interested in Woodworth's analogy between mental and physical work but is concerned with the validity of the principle of difficulty which he has offered. In suggesting the importance of difficulty as a factor, Woodworth maintains that it may be analyzed into two different factors which must be measured separately. He refers to one of these as the nature of the task and to the other as the standard of excellence attained as measured in terms of accuracy, or in terms of performance in some other task.

Investigators other than Woodworth have, in many cases, supported his belief, while others have added to it. Concerning the factors of homogeneity and difficulty, Dodge states

that within physiological limits, all fatigue decrement in the results of work is relative to the intensity of the stimulus and that "in any complex of competing tendencies, the relatively greater fatigue of one tendency will eliminate it from the competition in favor of the less fatigued tendencies." He believes also that the stimulus response connection is rendered weaker for a short time after its previous functioning. This might be interpreted as meaning that Dodge recognizes difficulty, competition, and previous functioning as important principles in the production of mental fatigue. Aria, also, holds that continued difficult mental work brings about a decrease in the efficiency of the function exercised. Poffenberger, on the other hand, emphasizes the importance of homogeneity. As a result of experimentation concerning the relationship between three different degrees of homogeneity and mental fatigue, he found that the greater the degree of homogeneity present in continuous mental work the greater was the amount of fatigue developed as a result of the work. Robinson, presented a list of six principles of the work decrement, and in collaboration with Bills, has tested them. He attached importance to the recency of the previous functioning of the stimulus response connection, the frequency of the previous stimulation, the connections between the stimulus and other responses, the strength of the particular connection, the qualitative and quantitative integrity of the stimulus

throughout the work period, and the decrements which had developed in other stimulus response connections. The first two of these principles indicate the direct relationship which exists between mental fatigue and homogeneity and continuity of mental work. The third and fourth uphold the belief that the development of fatigue is closely related to the presence of competing stimuli. The fifth of these is concerned with motivation and the "by products" of continuous work, and the sixth with the transfer of fatigue. In testing the principles of the work decrement listed by Robinson, Bills and Robinson found that in the presence of relatively greater homogeneity in a continuous mental task, there will be a correspondingly greater amount of fatigue developed. In another experiment, Bills related blocking, which is a phenomenon of mental fatigue, to homogeneity and competition, and pointed out the effect of a practice and fatigue on frequency and length of the block, to the relationship which exists between blocks and errors, to the degree of rhythmicity in the appearance of blocks, and to individual differences in the tendency to block. Muscio points out that "the specialization tendency (in industry) involves frequent exercise of the same parts of the body and the same elements of the mind. It scarcely needs to be pointed out that, unless precautions are taken, this procedure will lead to an over fatigue of the processes

involved in any industrial operation."

There has been but little mention in the literature of the correlation between intelligence and fatigability. Burnett found, in a study in which adult subjects were required to work continuously at a task of sewing, that those with highest and lowest intelligence quotients worked less efficiently than the others. She accounted for these findings by pointing out that for the most intelligent members of the group the task proved to be very monotonous while for the least intelligent ones it was too difficult.

In a study of school children, Kelley concludes that there is a positive relationship between the intelligence quotient, the greater is the evidence of fatigue. This is further corroborated by Winch who found that the older and more proficient students were less affected than others by fatigue during the school day. Valentiner found that the children of normal intelligence who participated in her experiments gave evidence of less rapidly developed fatigue than those of lower intelligence.

Problem

The purpose of this experiment is to determine whether difficulty and homogeneity are factors which influence the development of mental fatigue. If one or the

other, or both are found to operate as such factors, then, this experiment is further designed to discover their relative importance at two different levels of intelligence. Incidentally, it is hoped that this experiment will provide an answer to the question of whether or not individuals with superior intelligence develop fatigue, in the presence of particular conditions, more readily than those with normal intelligence, under the same conditions, or whether the reverse is true.

Definitions

Since there may be some misunderstanding of certain terms used in this dissertation, the author offers the following definitions of several of the more debatable concepts.

INTELLIGENCE -- For our purposes, intelligence is expressed in terms of scores obtained by individuals from the solution of the Otis Self-Administering Tests of Mental Ability (Higher Form A and B).

MENTAL WORK is work which involves relatively more use of the nervous system than of the musculature.

MENTAL FATIGUE is that state of diminished capacity to perform mental work which is caused by continuous mental work and disappears following freedom from the work which produced it.

DIFFICULTY is measured by the level of intelligence necessary for the successful solution of a given problem. It is recognized that in the problems chosen for this study, difficulty is also closely correlated with complexity.

HOMOGENEITY, as opposed to heterogeneity, refers to the presence of similar elements in each member of a series of problems, regardless of the arrangement of the component

parts of the problem.

Subjects and Conditions of the Experiment

Two groups of college men and women were used for the experiment. The groups were about equally divided on the basis of sex. The members of one group all obtained scores on the Otis Mental Test which indicates the presence of intelligence quotients which range between 122 and 133. The scores attained by those in the other group indicate intelligence quotients which range between 95 and 110. The groups were each subdivided into four divisions in order that the conditions of the experiment might be presented in varied order.

Four kinds of mental work constitute the conditions of the experiment. One is relatively easy and heterogeneous, one relatively easy and homogeneous, another relatively difficult and heterogeneous, and the fourth is difficult and homogeneous.

Preliminary Procedure

Before this experiment could be undertaken, it was necessary to find some manner of both producing and measuring mental fatigue. An investigation of the literature shows that, for the most part, studies in this field have employed, as methods of producing fatigue, mental addition and multiplication, cancellation, color naming, completion, and others which, as a rule involve more or less special

Fig. 1 - Photograph of Experimental Apparatus

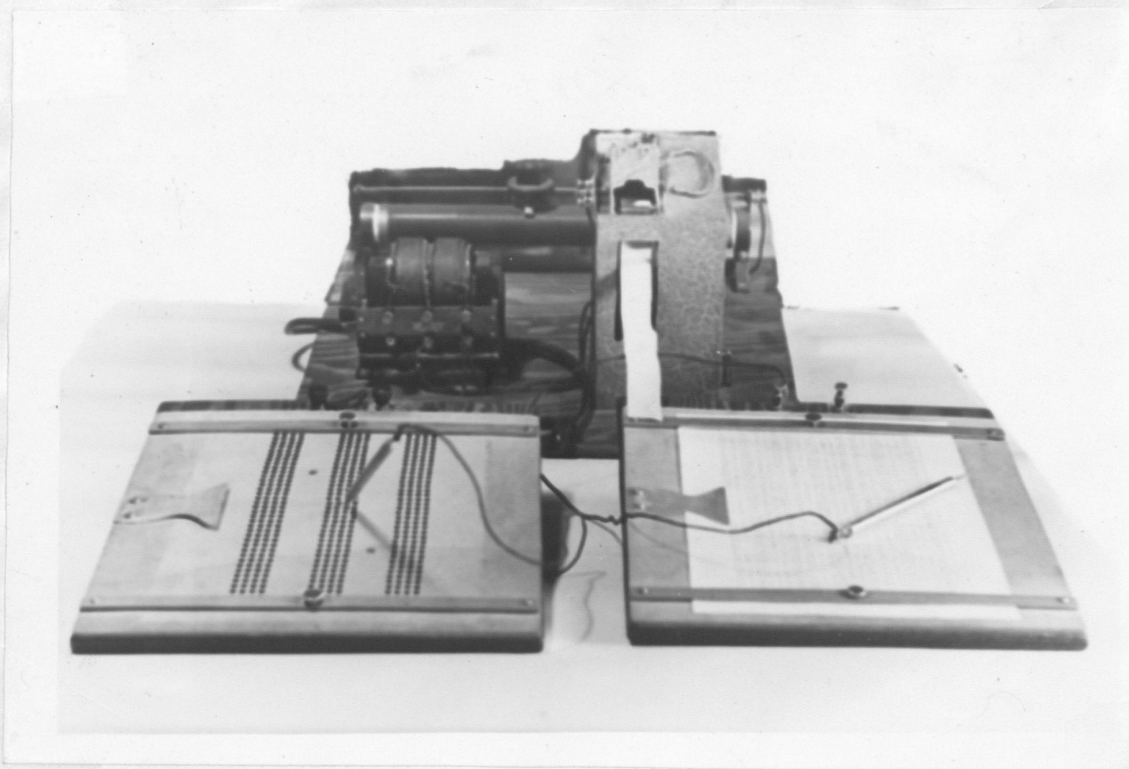
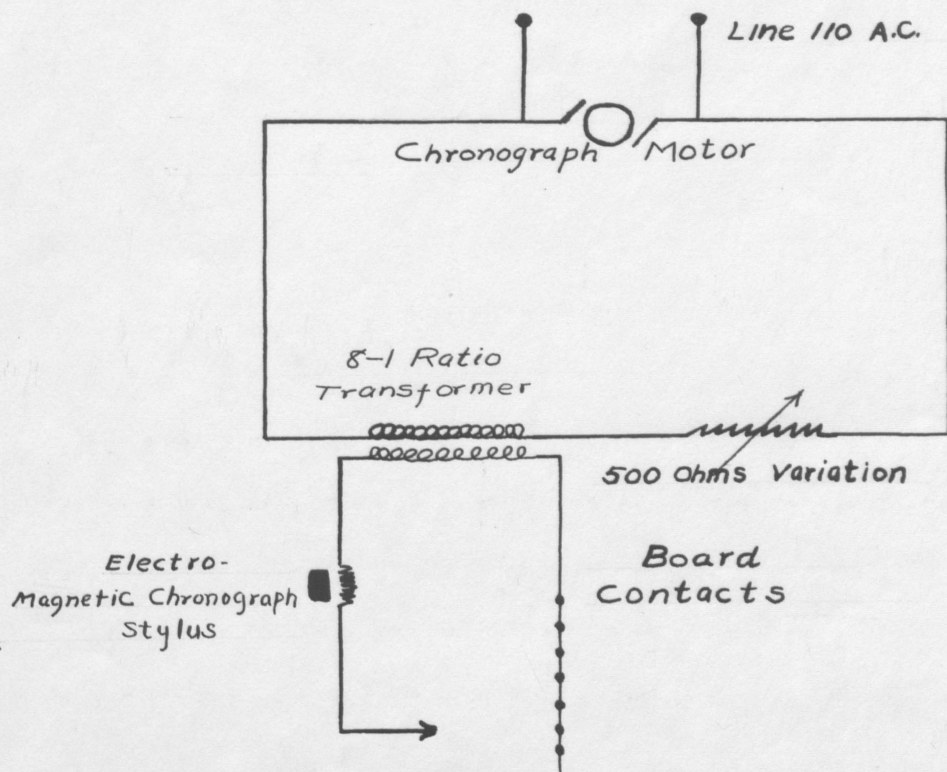


Fig. 2 - Wiring Diagram of Experimental Apparatus



abilities. The author felt that the solution of analogies, presented visually, involves a more fundamental aspect of intelligence and that continuous work at their solution should bring about a measurable amount of mental fatigue in a limited time, provided a fatigue producing element is present. Furthermore, it might be found that fatigue which had been produced in this manner might be in some way related to the level of intelligence of the individual. The belief that the ability to solve problems which require reasoning by analogy is a fundamental aspect of intelligence is supported by Thurstone, Henmon and Nelson and others who employ such material in the construction of tests of intelligence.

In the search for an adequate method of measuring fatigue, it was found that Oehrn probably made the first attempt to determine and analyze the work curve of mental functions. He measured, objectively, the efficiency of certain mental functions, by permitting his subjects to carry on continuous mental work for some time and to mark their work sheets at five minute intervals, so that the amount of work done during that period might be determined. His experiments included counting letters, proffreading, memorizing nonsense syllables and lists of numbers, addition, writing and oral reading. He suggested that the subject be allowed to work until the curve representing his work showed decided decrement. Then, if the values of the

maximum and minimum points of efficiency are determined, they may be substituted into the following formulae which he presented:

$$\text{Fatigue} = \frac{(M - m_2) \times 100}{M}$$

$$\text{Practice} = \frac{(M - m_1) \times 100}{M}$$

M = the value of the point of maximum efficiency
 m₁ = the value of the first point of minimum efficiency
 m₂ = the value of the second point of maximum efficiency

The method which Oehrman has outlined, proved to be unsatisfactory for use in the present experiment because it assumes that in the presence of fatigue, there is an apparent drop in the work curve. However, this need not be the case; in many curves, the effect of practice may obscure the influence of fatigue entirely.

It was found that Arai, too, has presented a method of measuring fatigue based on the assumption that practice must be allowed to develop to a degree of maximum value before the effect of fatigue can be measured. She suggested that fatigue could be indicated in terms of decreased amount of work which could be done in a given length of time or in terms of increased time required to do a certain amount of work. On the basis of this, she proposed two formulae, neither of which proved suitable for this study because of the comparatively short length of the work period which was employed in this study. She pointed out that a coefficient of fatigue might be obtained by substituting

the proper values in the following formulae:

Coefficient of fatigue = $\frac{(T_2 - T_1) \times 100}{T_1}$,
 when fatigue is measured as a function of the time required
 to do a given amount of work; and,

Coefficient of Fatigue = $\frac{(A_1 - A_2) \times 100}{A_2}$, when
 fatigue is measured as a function of the amount of work
 which can be done in a given time. T_1 and A_1 refer to the
 time required to do a given amount of work, and the amount
 of work which may be done in a given amount of time, at the
 beginning of the work period. T_2 and A_2 refer to the cor-
 responding values found to be present at the end of the
 work period.

Further examination of the research conducted dis-
 closed two other methods of computing fatigue and that
 modifications of either one of them might prove to be satis-
 factory in their application to this study. Thorndike
 has demonstrated that during a period of freedom from con-
 tinuous work which has produced mental fatigue, the value
 of the practice afforded by the work is retained and the
 effect of fatigue is lost. He pointed out that the amount
 of fatigue which has developed might be calculated by com-
 paring the performance at the end of a period of work with
 that after a period of rest. Lindley offered the second of
 these methods and, in correction of Thorndike's method,
 pointed out that the effect of practice is lost if extended

over too long a period of time and that the effect of fatigue is retained if the rest period is of too short duration. He suggested, then, that a number of trial rest periods of various lengths be introduced in order to determine the rest period which provides the greatest possible loss of fatigue with the least amount of loss of practice.

The author felt that, although the subject had previously been instructed in the method of solution of the analogies, he would at the same time benefit by the practice afforded him during the 10 minute period of work and be inhibited by the developing fatigue. If a 5 minute rest period were permitted to follow this, the influence of the previous practice would be retained and the fatigue which had developed would disappear. The particular lengths of time employed were found to be satisfactory for use and it appeared unnecessary to make an investigation of the best rest period as Lindley has suggested. It was found possible, by continuing the same kind of work for three minutes at the conclusion of the rest period, to compare both the rate of performance and the percentage of error during a corresponding number of minutes before and after the rest period, in order to determine any change in efficiency which might have taken place. Increased efficiency following the rest period could be interpreted as an index of the amount of fatigue which had developed during the

first work period. Two formulae were used in the computation of percentage of fatigue. One is representative of percentage of decrement in number of problems solved per minute and the other, of percentage of decrement in errors per minute. Both follow in the same order:

$$\text{Percentage of decrement} = \frac{(N/M_2 - N/M_1) \times 100}{N/M_1}$$

$$\text{Percentage of decrement} = \frac{(PE/M_1 - PE/M_2) \times 100}{PE/M_1}$$

N/M_1 and PE/M_1 refer to the average number of problems solved during each minute of the three minute period immediately preceding the rest period and the percentage of error during the same period. N/M_2 and PE/M_2 refer to the corresponding values of the work period immediately following the rest period.

Since the problem involves a study of the influence of difficulty and homogeneity upon the development of mental fatigue, it was found that it was necessary to prepare a series of analogies which contained the element of difficulty; another, in which there was an absence of difficulty; a third, in which homogeneity was present; and a fourth, in which there was no homogeneity. Since it is impossible to have a series, which contained only one of these elements and was at the same time totally lacking in all of the others, it became apparent that it would be necessary to produce one series which was at the same time difficult and

homogeneous; one which was difficult and heterogeneous; one which was relatively easy and homogeneous, and another which was relatively easy and heterogeneous. Since two levels of intelligence were being considered, corresponding sets of problems were made for each. For convenience, however, those which were recognized as difficult for the members of the group having lower intelligence scores were accepted as being of relatively little difficulty for the members of the other. In this way only six, rather than eight, series of analogies were made. The individual problems, in many cases were selected from the 1932 edition of the American Council on Education Psychological Examination and from the 1929 edition of the Henmon-Nelson Tests of Mental Ability. The others were devised by the author. The problems, in mixed order, were submitted to individuals of known intelligence ratings for solution. On the basis of the results of this procedure, they were arranged in the order of difficulty and assembled into heterogeneous series. In order to introduce the factor of homogeneity, a single problem was rearranged repeatedly and the order of correct response so varied that it could be presented a great number of times with a marked degree of similarity and yet with the absence of repetition of identical problems.

Originally, an exposure apparatus was built which would permit a single problem to be seen at any given time.

This apparatus consisted of a metal container about twelve inches long, six inches high and four inches wide. It contained a number of rollers over which a strip of paper, upon which were printed the problems, could be passed and fastened so that a half inch strip was exposed. One roller was slotted and a wire loop operated by an electric solenoid was fitted into one of the slots. When an electric circuit was completed, the wire was drawn in such a manner that the roller was advanced a half inch, thereby causing the next analogy in line to be presented. A four key double electric switch was used to complete the circuit. One key represented each of the four possible solutions and when depressed both recorded the choice made on a four pen electric chronograph and recorded the time required by the subject to make his judgment.

Two disadvantages of the apparatus described above are of such importance that they may be mentioned as a precaution to other experimentors. It was found that although the rollers were cleaned with alcohol from time to time in order to remove any remnants of the highly glazed paper which was used, there was so much slippage on the part of the paper that this method could not be used. Probably the best method for overcoming this difficulty would have been to cut openings in the paper at half inch intervals and surround them with metal 'eyelets' and then

to place extensions at each end of one roller so that the extensions would fit into the eyelets and draw the paper along when the electric circuit was completed. A second disadvantage was found in the fact that after a few minutes of continuous operation, the solenoid became so highly magnetized that completion of the circuit failed to cause the wire loop to be retracted. This, of course, caused a failure of the succeeding problem to appear. Together, the difficulties provided by the use of this apparatus caused it to be discarded. The apparatus described is illustrated below.

Apparatus and Procedure

A punchboard was constructed upon which sheets of visual analogies might be placed. Each sheet which was used was made up of three rows of thirty-six problems. Each problem was further composed of seven symbols, four of which represented possible solutions. The punchboard was so planned that beneath each of the four symbols, which might be chosen by the subject as the correct response, was an opening. The base of the opening in every case was composed of copper. When the subject punched through the paper with a stylus he completed an electric circuit and caused a record of the movement to be made upon a strip of paper moving through a chronograph which was operated by a synchronous motor. By this method, the sub-

ject made a record of his choice of solution and, at the same time, caused an indication of the length of time required to be recorded.

Experimental Procedure

Each member of both groups worked under a different set of conditions on each of the four days of work. The same procedure was followed on each day. The subject was shown several sample problems and was instructed in their solution. He was told to look at the first two symbols and to discover by what change the first had formed the second. Having done this, he was asked to choose the one of the last four symbols which he believed represented a similar change from the third. When it had been ascertained that the subject clearly understood the method of solution, he was seated before a punchboard upon which a work sheet had been placed. He was then given a metal stylus and told to contact and electrode with it until he was given a signal to begin. By making such contact, the subject caused a record of the time at which work was initiated to be made upon a chronograph tape. He was told not to work so fast that he might expect to commit a great number of errors nor to work exceedingly slowly. He was allowed to work for ten minutes, after which he was told to stop. However, care was taken to permit him to finish the problem upon which he was working so that its partial

solution would not give him an advantage after the rest period. During the five minute rest period, the subject was allowed to read, or talk, or amuse himself in any way other than by examining or discussing the problems. Following this, he again touched the stylus to the same electrode as before, before resuming work for three minutes.

Each work sheet was examined for errors by comparing it with a correctly marked master sheet. The chronograph tape was marked off into lengths representing one minute each. The number of problems solved during each minute was determined by counting the corresponding marks on the tape. From the ratio between problems done and errors committed per minute, it was possible to compute the percentage of error during each minute.

For convenience, a page in a large ledger book was maintained for each subject and upon it was written the record of the work done under each of the four conditions. Separate tables of the work done during each minute under each condition by all of the members of the group were also prepared.

Results

The results are treated as though two independent experiments had been performed; one dealing with a group of

individuals of superior intelligence and the other with a group of individuals of normal intelligence.

Experiment 1

This experiment is concerned with the influence of the homogeneity and the difficulty of continuous mental work upon the development of mental fatigue in college students of superior intelligence. Work curves which represent the average number of problems completed during each minute and the average number of errors per problem per minute are presented graphically, in Figure 3. An examination of curves 1a and 1b will show that the members of the group solved more homogeneous easy problems and made a smaller percentage of errors following the rest period. Curves 2a and b, and 3a and b illustrate the existence of similar findings for homogeneous difficult and heterogeneous easy problems. Curves 4a and b indicate that not only was there no increase in rate of performance in heterogeneous difficult work after the rest period, but the ratio of errors to problems was increased.

Fig. 3 - Work Curves of Homogeneous and Heterogeneous Easy Problems.

Superior Group

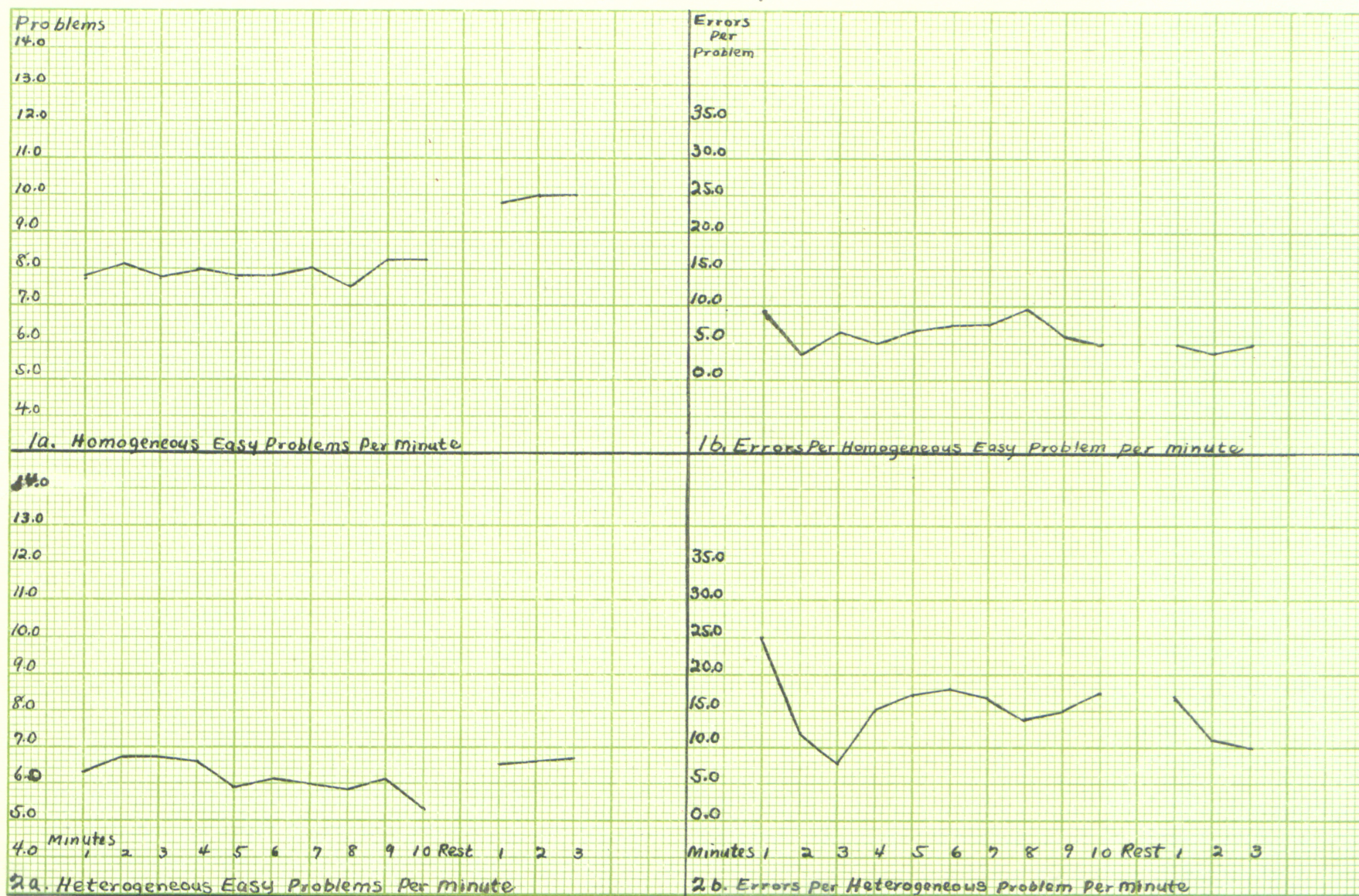
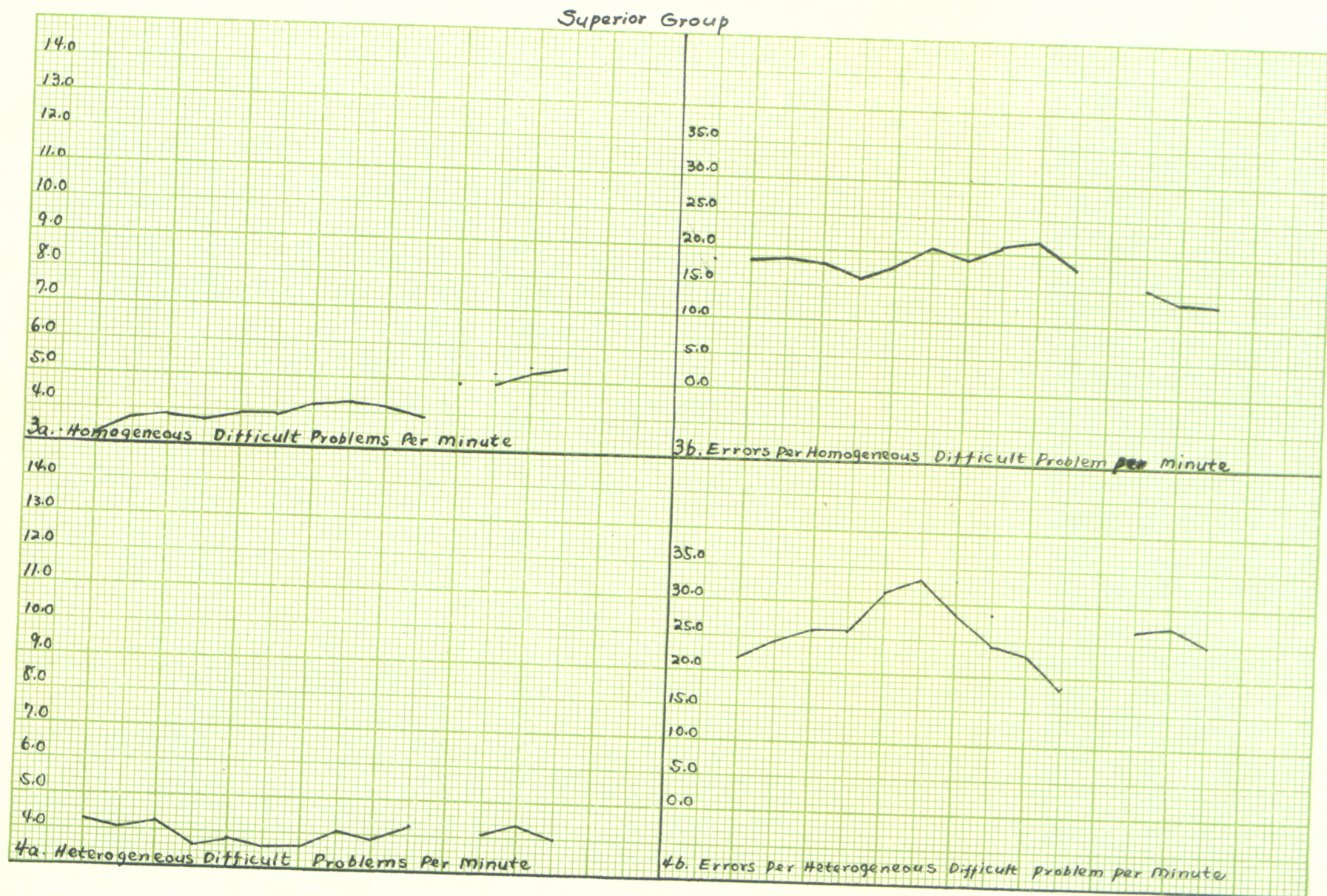


Fig. 3 - Work Curves of Homogeneous and Heterogeneous Difficult Problems.



If we use, as a measure of the fatigue decrement resulting from continuous work the increase in efficiency after rest over that just before rest, we can assume that all of the conditions show fatigue decrement except the one involving both heterogeneity and difficulty.

The data were treated in two ways with the aid of the formulae described above. This method provided the means for obtaining two different indices of fatigue for each condition; one based upon differences in the rate of performance, and the other upon differences in the quality of performance. As a result of this treatment it was found that continuous mental work which was at the same time homogeneous and difficult produced more fatigue than any of the other kinds of work, when fatigue was measured in terms of amount done. The next greatest amount of fatigue was produced by continuous homogeneous easy mental work. This was followed, in order, by heterogeneous easy and heterogeneous difficult mental work. When fatigue was measured in terms of changes in quality of performance, it was found that the same order was maintained except that, in this instance, homogeneous easy work resulted in slightly greater fatigue than that produced by work which was homogeneous and difficult. This finding is of great importance, since it indicates that homogeneous work which

is either difficult or easy produces marked fatigue. The coefficients of fatigue and their derivations are presented in Tables 1 and 2.

Table 1. Superior I.Q. Group
Coefficient of Fatigue Problems per Minute

Condition	M ₁	SD ₁	PE ₁	M ₂	SD ₂	PE ₂	M ₂ -M ₁	PE	CR	CF
D.M.	4.09	1.55	.087	5.87	2.11	.12	1.78	.14	12.7	43.5
D.H.	4.10	1.79	.103	4.5	1.44	.087	.4	.106	3.77	9.7
E.M.	7.90	3.02	.145	9.8	3.14	.182	1.9	.23	8.26	24.1
E.H.	5.80	1.89	.108	6.6	2.56	.147	.8	.19	4.2	13.7

Table 2. Superior I.Q. Group
Coefficient of Fatigue Errors per Problem per Minute

Condition	M ₁	SD	PE	M ₂	SD	PE	M ₂ -M ₁	PE	CR	CF
D.M.	21.9	21.4	2.08	16.3	14.3	1.39	-5.6	2.5	2.24-25.5	
D.H.	21.7	15.5	1.5	26.3	17.5	1.71	-4.6	2.4	1.91-21.9	
E.M.	6.7	7.4	.72	4.7	7.2	.70	-2.0	1.00	2.0-29.8	
E.H.	15.3	11.9	1.15	12.5	8.6	.83	-3.4	1.40	2.42-22.2	

D.M. Difficult Homogeneous condition.

D.H. Difficult Heterogeneous condition.

E.M. Easy Homogeneous condition.

E.H. Easy Heterogeneous condition.

M₁ Average number problems per minute before rest.

M₂ Average number problems per minute after rest.

PE₁ Probable error of M₁.

PE₂ Probable error of M₂.

SD Standard Deviation.

CR Critical Ratio.

CF Coefficient of Fatigue.

The relative importance of homogeneity and of difficulty may be clearly shown by comparing the average amount of fatigue developed in both homogeneous conditions with the average amount developed in both heterogeneous condi-

tions. The former was found to yield a fatigue decrement whose size is indicated by an average increase of 33.7% in problems per minute and an average decrease of 27.6% in errors per problem per minute following the rest period. The latter, on the contrary, showed only a very slight decrement indicated by an increase of 11.7% in problems per minute and a decrease of .15% in accuracy after the rest. This can leave no doubt concerning the greater influence exerted by homogeneity upon the development of fatigue. A similar procedure was followed in an attempt to discover the importance of difficulty as contrasted with easiness. It was found that, when fatigue was measured in terms of the quantity of performance, work involving the two difficult conditions produced an average increase of efficiency of 26.6%, while in the absence of difficulty the average increase of which was 19.4%. When quality of performance was used to determine the coefficient of fatigue it was found that difficult work was accompanied by a decrement of 26% and easiness by one of 1.8%. This may be interpreted as meaning that neither difficulty nor easiness is of greater importance in the establishment of mental fatigue in the group of superior individuals studied.

Experiment II

This experiment is concerned with the influence of the homogeneity and difficulty of continuous mental work upon the development of mental fatigue in college students of normal intelligence. Work curves illustrating the rate of performance and the ratio between problems completed and errors made during each minute of the work period are presented in figure 4. Curves 1a, and 1b, show that for homogeneous easy problems there is a significant increase in efficiency following the rest period. Curves 3a, and 3b, demonstrate similar findings as a result of homogeneous difficult work. For heterogeneous easy problems there is a significant increase following the rest period, when problems solved per minute are considered but when the ratio of problems and errors per minute is taken into consideration no significant change is noted. This is seen by an examination of curves 2a and 2b. Curves 4a, and 4b, show that there is essentially no increase in the rate of performance following the rest period and that there is no decrease in the ratio between errors and problems solved.

These findings are similar to those found in the data obtained from the work of the superior group of students. Apparently the most important difference lies in

the fact that when quantity alone is considered, it is found that a relatively great amount of fatigue was developed during the ten minutes of continuous heterogeneous work in the normal group. However, this was not found to be true on the basis of accuracy.

Table 3. Normal I.Q. Group
Coefficient of Fatigue Problems per Minute

Condition	M1	SD1	PE1	M2	SD2	PE2	M2-M1	PE	CR	CF
D.M.	5.76	2.55	.169	7.13	2.33	.15	1.37	.22	6.08	23.7
D.H.	5.44	2.87	.19	5.89	3.22	.21	.45	.28	1.60	8.2
E.H.	8.88	2.90	.19	11.46	4.17	.27	2.58	.34	7.58	29.0
E.M.	10.6	3.51	.23	14.1	4.74	.31	3.5	.39	8.90	33.0

Table 4. Normal I.Q. Group
Coefficient of Fatigue Errors per Problem per Minute

Condition	M1	SD	PE	M2	SD	PE	M2-M1	PE	CR	CF
D.M.	18.5	13.8	1.56	9.3	12.4	1.40	-9.5	2.09	4.68	-51.3
D.H.	33.1	20.6	2.28	28.3	16.6	1.88	-4.8	2.95	1.62	-14.5
E.H.	12.6	21.1	2.44	8.1	9.5	1.19	-4.5	2.13	2.14	-35.7
E.M.	7.1	6.6	.75	5.5	6.8	.75	-1.6	.33	4.7	-22.5

In this experiment, as in the other, the data were treated in such a manner that two different indices of fatigue were obtained for each condition. It was found that the two homogeneous conditions produced fatigue to a greater extent than that produced by work containing the factor of heterogeneity. It was found, also, that difficult work in the absence of homogeneity produced but little fatigue. These facts are presented numerically in tables 3 and 4.

Fig. 4 - Work Curves of Homogeneous and Heterogeneous -
Difficult Problems

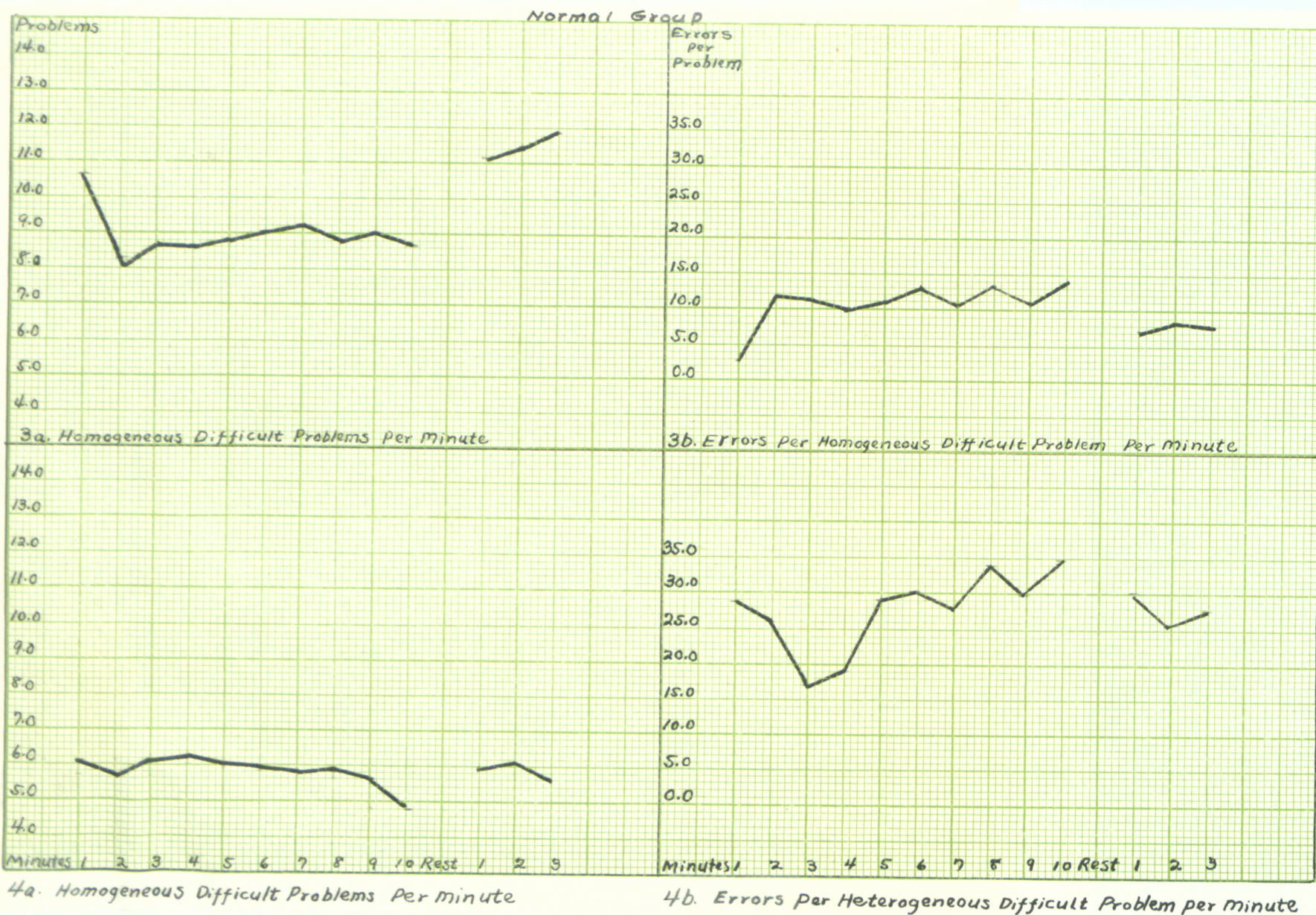
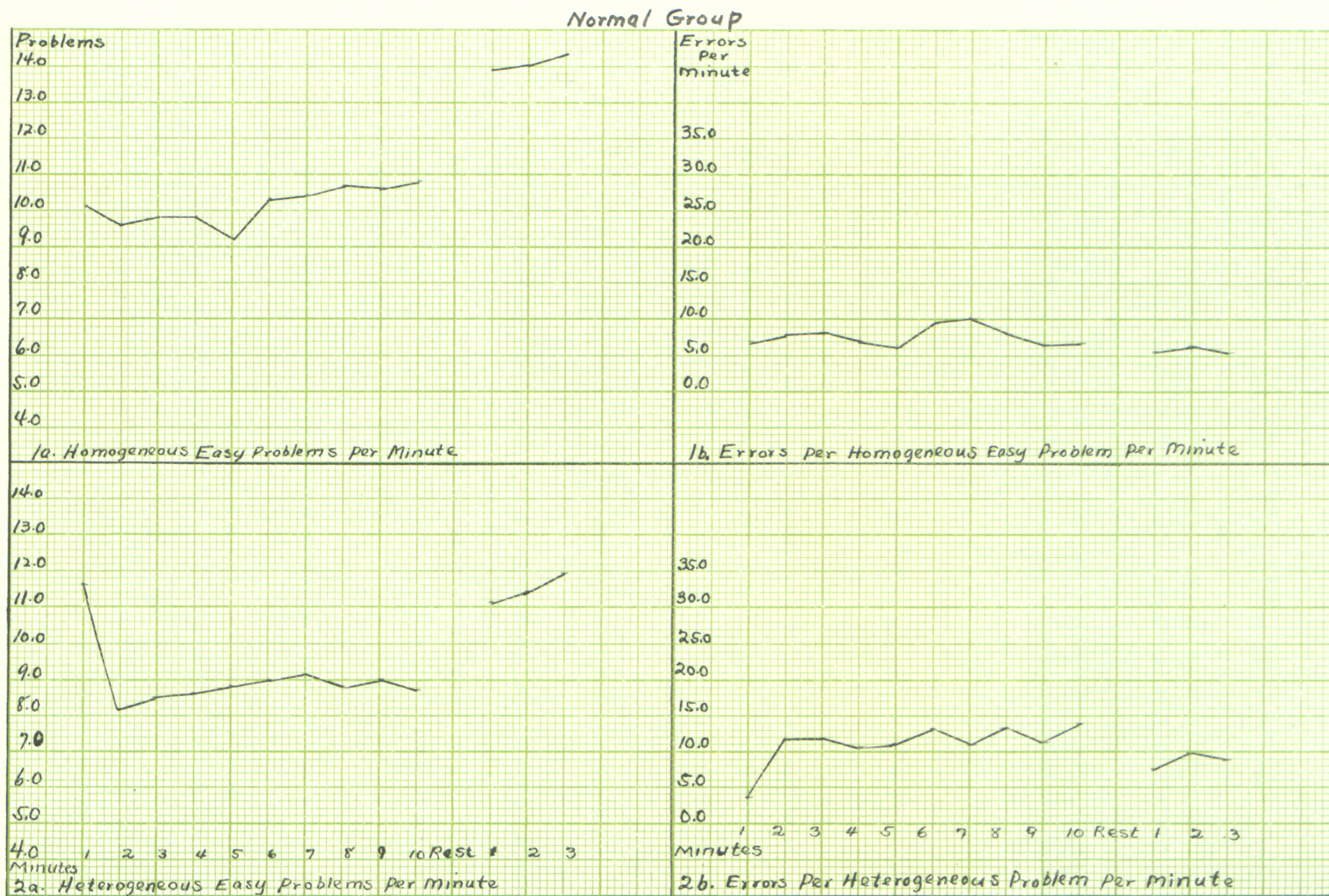


Fig. 4 (Ct'd.) Work Curves of Homogeneous and Heterogeneous - Easy Problems



When coefficients of fatigue representing the homogeneous conditions were compared with those representing the heterogeneous conditions, it was found for the former that on the basis of problems solved per minute, the average percentage of increase after the rest period was 28.4. For the other, the average was found to be 18.6%. On the basis of errors per problems per minute, the corresponding results were 39.9% for homogeneous material and 25.1% for heterogeneous.

When the factors of difficulty and easiness were compared, it was seen that continuous mental work of relatively little difficulty was accompanied by the development of greater fatigue than in the presence of work which was more difficult, when fatigue was measured in terms of the quantity of work done. This is shown by an average coefficient of 31.0% for easy work and one of 15.9% for difficult work. When the coefficients were computed on the basis of accuracy the reverse was found to be true. Easy work was accompanied by an index of 22.9% and difficult by one of 34.1%

In general, the results obtained from the work of the members of the normal group show that in the presence of homogeneity, fatigue is produced as a result of continuous mental work. They show further that greater fatigue fails to develop either in the presence or in the absence of relatively great difficulty.

Summary and Conclusions

As a result of the procedure followed and the data obtained, it is apparently true that continuous homogeneous mental work is accompanied by the development of diminished capacity to perform the same task. This is true for both a group of college students of superior intelligence and for one of normal intelligence. The results further indicate that mental work accompanied by difficulty or easiness, in the absence of homogeneity produces, in general, less fatigue than in the presence of homogeneity. It is important, also, to notice that in those conditions, in which mental work was difficult but heterogeneous, there was less fatigue developed than in any of the other conditions. This occurs in both the superior and in the normal group.

The results may be summarized in the following statements:

1. Homogeneity is a factor of great importance in the development of mental fatigue in groups of individuals of normal and of superior intelligence.

2. Difficulty is not a factor in the development of mental fatigue of groups of individuals of normal or of superior intelligence.

3. Differences in intelligence between a group of normal and one of superior college students are of no great importance in the development of mental fatigue following

continuous homogeneous mental work.

Interpretation and Discussion

Results of this experiment may be interpreted in terms of the principle of homogeneity which was established by Dodge and which has been supported by Robinson, Thorndike, Poffenberger, Bills and others. These results fail to give support to the principle of difficulty which has been assumed to exist by Woodworth and supported by Dodge and others.

The fact that homogeneous mental work, whether accompanied by difficulty or not, brought about mental fatigue in this study indicates that it is true that the repetitive stimulation of a particular mental process is an active principle of mental fatigue. This may be further demonstrated by the fact that even when as large a number of heterogeneous problems were solved per minute as homogeneous ones, very little fatigue developed. This is explainable in terms of the number of different kinds of elements present in the problems. Homogeneous problems, while actually made up of the same number of elements, did not offer the possibility for the stimulation of as many different mental processes as those which contained more diverse elements. This accounts both for a reduced rate of stimulation by heterogeneous work and for opportunity for greater recovery from previous

functioning of a given stimulus response connection.

As a further development of this problem several possible experimental approaches present themselves.

The present experiment might be repeated among individuals of less than normal intelligence in order to find whether or not homogeneity and difficulty operate as fatigue principles at that level. In such an experiment, the problems involving reasoning by analogy would have to be reduced in difficulty in order to correspond to the abilities of the subjects.

In order to further test difficulty as a principle of the work decrement, an experiment might be undertaken which is concerned with the development of mental fatigue in the presence and absence of difficulty, measured in some other manner than employed in this study. Such an experiment as the one proposed might also be carried out among individuals having intelligence quotients indicating borderline intelligence in order to learn whether or not difficulty plays a more important part in the development of fatigue in individuals of that status.

An experiment similar to the present one might be conducted in which motivation were allowed to play a more important part. In this case, part of the group of subjects would be given some added incentive for work.

A highly important aspect of the present experiment

would be one in which blocking as a principle of fatigue were related to the complex mental process of reasoning by analogy.

A study of some importance to education would be one in which the effect were noted of mental fatigue established by one kind of mental work upon the ability to carry out some other kind of mental work.

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The following symbols and formulae are used in tables throughout the appendix:

N/M1 - Average number of problems during the three minutes immediately preceding the rest period.

N/M2 - Average number of problems during the three minutes immediately following the rest period.

Chge.- Difference in rate of performance or in quality of performance during the three minutes before and after the rest period.

$$\% \text{ Chge.} - \frac{N2 - N1}{N1} \times 100$$

E/M1- Average number of errors during the three minutes immediately preceding the rest period.

E/M2- Average number of errors during the three minutes immediately following the rest period.

$$\% \text{ E1} - \frac{E/M1}{N/M1} \times 100$$

$$\% \text{ E2} - \frac{E/M2}{N/M2} \times 100$$

$$\text{Chnge } \% \text{ E.} - \frac{\% \text{ E1} - \% \text{ E2}}{\% \text{ E1}}$$

$$\% \text{ Chge. } \% \text{ E.} - \frac{-(\% \text{ E1} - \% \text{ E2})}{\% \text{ E1}} \times 100$$

APPENDIX

- I. Problem Sheets Pages 37- 42
- II. Superior Group Problems and Errors Per Minute All Conditions 43- 50
- III. Superior Group Decrements All Conditions 51- 54
- IV. Normal Group Problems and Errors Per Minute All Conditions 55- 62
- V. Normal Group Decrements All Conditions 63- 66

Normal Group Homogeneous Easy Problem Sheet

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Normal Group Heterogenous Easy Problem Sheet

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Table 5.- Easy Homogeneous Problems Per Minute By Members Of Superior I.Q. Group

Subjects	Minutes												
	1	2	3	4	5	6	7	8	9	10	1	2	3
1	5	5	7	5	4	7	7	5	4	4	5	5	5
2	9	10	11	11	11	10	11	12	10	11	11	15	16
3	5	6	6	6	6	7	8	6	7	5	8	7	7
4	8	8	6	10	6	8	4	6	7	8	9	8	10
5	8	8	7	6	10	5	5	5	9	9	11	13	12
6	4	9	9	12	7	8	8	7	6		9	9	7
7	6	7	6	7	8	5	7	5	7	7	9	11	9
8	6	9	7	11	5	8	4	6	5	5	10	9	10
9	6	7	7	6	8	7	7	5	7	7	7	11	8
10	9	8	8	8	9	10	10	8	12	8	10		
11	8	6	9	9	8	7	9	8	7	8	10	9	10
12	8	6	6	8	7	6	7	7	5	7	7	7	11
13	9	9	10	11	8	10	9	8	10	9	12		
14	8	6	7	7	7	8	9	6	7	9	9	7	
15	9	7	6	5	8	6	7	7	6	5	6	6	10
16	10	6	7	4	10	7	5	6	6	7	12	10	10
17	13	12	9	10	12	8	5	9	11	6	13		
18	4	5	3	6	6	6	5	6	6	7	8	8	8
19	8	6	5	4	4	5	6	6	6	3	10	8	6
20	16	17	16	15	15	14	14	14	18	14	18	14	17
21	8	4	3	4	5	5	7	6	3	6	8	6	7
22	5	6	4	7	5	8	5	5	5	7	3	10	10
23	5	8	9	9	8	8	10	7	9	11	13	6	12
24	8	7	6	6	6	6	5	4	6	7	9	10	7
25	4	10	10	11	7	7	8	7	10	11	11	11	
26	6	6	7	9	9	9	7	8	7	8	7	7	9
27	9	10	9	10	10	10	10	7	12	12	12	14	12
28	16	16	13	13	10	13	12	13	16	14	17	13	16
29	8	7	12	9	10	12	9	11	11	10	13	15	15
30	13	13	12	8	11	10	15	15	11	13	17	11	17
31	6	5	6	6	3	7	7	8	6	3	8	8	8
32	5	7	6	8	6	4	4	8	6	5	9	10	10
33	9	5	7	13	7	8	7	8	8		9	9	10
34	5	7	8	7	9	9	7	7	8	9	9	9	10
35	12	9	15	8	8	12	9	11	11	10	11	11	3
36	9	11	8	6	11	11	12	12	8	5	13	12	
37	10	12	7	8	6	7	11	10	10		10	11	
38	7	10	7	11	10	10	8	16	11	10	11	14	14
39	5	5	5	6	6	6	8	7	7	6	8	8	9
40	8	10	10	9	7	7	10	9	9	10	9	9	7
41	4	4	3	3	2	4	3	4	6	5	4	6	6
42	9	11	10	11	11	11	12	7	14	10	13	17	14
43	8	7	7	8	6	5	10	4	5	6	9	9	8
44	8	8	8	12	10	6	9	8	8	9	10	11	
45	4	7	8	3	3	5	5	7	4	6	7	5	8
46	11	15	11	13	13	13	12	11	12	18	12	13	15
47	5	6	7	4	7	5	8	4	4		4	7	5
48	9	8	8	9	10	9	10	6	11	11	11	14	12
Average	7.8	8.1	7.8	8.0	7.8	7.8	8.0	7.5	8.2	8.2	9.8	9.8	10.0

Table 6.- Errors in Easy Homogeneous Problems Per Minute By
Members Of Superior I.Q. Group

Subjects	Minutes										Rest	1	2	3	
	1	2	3	4	5	6	7	8	9	10					
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	-	-	-	1	1	-	1	-	-	-	-	-	-	-
3	-	-	-	-	2	-	-	2	-	1	-	1	-	-	-
4	3	2	2	1	2	1	2	1	1	3	-	-	2	2	-
5	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-
6	-	-	-	-	-	1	-	2	-	-	-	1	-	-	1
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	3	-	-	-	-	-	-	1
9	1	-	-	1	-	-	-	-	2	2	-	-	-	-	-
10	-	1	-	-	1	3	2	1	1	3	-	1	-	-	-
11	1	-	-	1	-	-	2	2	1	-	-	-	-	-	-
12	2	1	3	2	-	1	2	3	-	-	-	1	-	-	1
13	-	1	-	-	1	4	3	1	1	-	-	2	-	-	-
14	1	-	-	1	-	2	1	1	1	1	-	-	-	-	-
15	3	1	1	-	2	1	3	4	1	1	-	-	-	-	1
16	-	-	-	-	-	1	1	1	-	1	-	1	-	-	-
17	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-
18	-	1	-	-	1	-	-	-	1	1	-	-	1	1	-
19	-	-	-	-	-	1	-	-	1	-	-	-	1	1	-
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
22	-	-	-	-	-	1	-	-	-	1	-	-	-	-	1
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	1	0	-	-	1	-	-	-
25	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-
26	1	-	1	-	-	2	1	-	1	-	-	-	2	-	-
27	-	-	1	1	2	5	2	-	2	-	-	-	1	-	-
28	-	-	1	2	1	-	1	-	2	-	-	-	2	2	-
29	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-
30	1	-	-	-	-	2	-	-	-	-	-	1	1	2	-
31	1	-	-	-	1	1	-	1	-	-	-	-	1	1	3
32	1	-	-	2	2	-	-	-	1	-	-	1	-	-	-
33	1	1	1	-	-	-	2	1	2	-	-	-	-	-	-
34	1	-	-	1	-	-	-	2	-	1	-	2	2	-	-
35	-	1	5	1	2	-	1	-	-	1	-	1	-	-	2
36	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
37	3	3	4	1	1	2	2	2	2	-	-	2	-	-	-
38	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
39	3	1	-	-	-	1	-	1	1	-	-	2	-	-	-
40	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
41	1	1	1	1	2	1	1	1	1	1	-	-	2	2	-
42	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-
43	2	-	1	1	-	-	-	1	-	-	-	2	-	-	-
44	1	-	-	-	1	-	-	-	-	1	-	1	-	-	-
45	2	-	-	1	1	1	-	1	-	2	-	-	1	-	-
46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	3	-	-	1	-	-	-	1	-	-	-	2	3	1	-
48	-	1	1	1	2	-	3	1	2	-	-	-	-	-	1
Average	.7	.3	.5	.4	.5	.6	.6	.7	.5	.4		.5	.4	.5	

Table 7 .-- Easy Heterogeneous Problems Per Minute By Members Of Superior I.Q. Group

Subjects	Minutes										Rest			
	1	2	3	4	5	6	7	8	9	10		1	2	3
1	5	4	5	6	3	4	4	4	3	5	6	6	4	
2	5	7	5	6	7	6	6	8	8	5	8	7	3	
3	4	8	8	7	3	6	5	5	4	5	6	5	7	
4	11	13	10	10	12	10	8	8	10		13	13	14	
5	9	6	9	8	8	7	10	6	6	7	8	7	10	
6	3	5	6	7	5	6	5	3	6	6	8	5	5	
7	1	2	2	4	2	4	5	4	4	4	4	6	7	
8	6	5	4	5	4	3	4	5	4	5	6	5	6	
9	-	4	4	6	7	6	8	3	5	6	5	5	3	
10	4	5	4	9	6	7	9	8	6	6	4	5	8	
11	2	7	4	9	5	4	7	7	5	6	5	6	7	
12	8	8	13	11	7	11	7	8	7	8	7	10		
13	10	10	8	9	5	10	6	6	8		10	9	10	
14	8	9	9	6	4	6	7	6	6	5	5	6	6	
15	7	3	6	6	6	6	5	8	8	5	4	8	8	
16	5	6	4	7	7	7	6	7	7	6	6	7	7	
17	10	12	8	5	7	9	8	7	9	6	9	9		
18	1	4	4	4	4	2	6	5	4	4	5	5	5	
19	4	3	5	2	5	4	6	2	6	3	7	7	7	
20	7	8	11	9	9	9	8	6	9	8	8	8		
21	8	5	5	7	6	3	3	5	6	4	4	5	4	
22	4	6	7	5	4	4	4	3	4	4	6	5	3	
23	6	4	5	6	8	4	6	6	6	8	5	6	6	
24	5	6	5	7	5	4	4	6	4	4	7	4	4	
25	8	6	7	3	3	4	4	5	5	6	5	5	5	
26	3	3	3	3	2	5	4	3	3	4	3	5	5	
27	8	6	10	5	8	7	8	6	6	6	9	6	9	
28	13	9	6	8	9	6	8	8	5	8	7	10	5	
29	7	3	4	5	5	4	2	2	3	4	3	3	6	
30	7	9	10	5	7	7	7	7	9	8	9	7	9	
31	6	8	8	7	4	4	4	4	5	6	3	6	5	
32	7	6	9	6	5	5	6	4	4	5	5	4	5	
33	6	6	3	8	4	7	5	5	6	4	5	5	7	
34	8	6	9	7	7	6	6	8	7	3	9	7		
35	11	11	6	6	8	6	7	6	7	6	8	6	7	
36	7	7	14	10	8	11	8	7	8	8	6	8		
37	10	12	6	6	8	6	7	6	8	5	6	8	8	
38	6	8	8	5	4	5	7	6	9	7	7	5	9	
39	5	5	6	7	3	5	5	5	4	5	6	4	2	
40	4	6	8	8	6	3	4	8	6	6	8	8	10	
41	3	3	3	3	3	4	3	3	3		2	5	2	
42	9	11	13	12	11	7	8	10	10	10	10	13	17	
43	10	10	8	9	8	8	8	6	6	10	11	11		
44	8	8	10	8	5	8	6	8	7	5	7	9	7	
45	7	10	10	9	9	12	6	8	8		8	9	7	
46	4	5	5	6	5	6	4	3	6	7	7	5	8	
47	4	4	5	7	6	4	5	5	2	5	6	7	6	
48	10	13	9	6	9	8	7	9	12	8	8	7	15	
Average	6.3	6.7	6.7	6.6	5.9	6.1	6.0	5.7	6.1	5.8	6.5	6.6	6.8	

Table 8 -- Errors in Easy Heterogeneous Problems Per Minute By
Members Of Superior I.Q. Group

Subjects	Minutes										Rest	1	2	3
	1	2	3	4	5	6	7	8	9	10				
1	1	1	1	-	3	1	1	2	-	2	-	-	-	-
2	2	5	2	1	3	2	-	3	1	2	6	4	2	
3	1	2	-	1	2	2	1	-	-	2	1	2	1	
4	2	1	1	2	2	3	-	3	1	-	2	5	1	
5	1	-	1	2	-	-	1	-	-	1	-	-	-	
6	1	2	-	-	1	1	-	1	-	2	-	1	2	
7	-	1	1	1	1	1	1	-	-	-	2	1	1	
8	1	1	-	1	-	1	-	2	1	1	3	1	-	
9	-	-	-	1	-	-	1	1	2	3	2	1	1	
10	2	1	-	-	2	3	4	2	-	1	-	1	-	
11	2	-	1	-	-	2	3	-	-	1	-	1	1	
12	3	-	1	2	1	-	-	-	-	3	1	1	1	
13	1	2	-	3	2	2	1	1	2	-	3	-	1	
14	3	1	1	1	2	2	2	2	-	1	3	1	1	
15	1	1	-	-	-	1	1	-	2	-	-	-	1	
16	1	-	1	1	-	1	2	1	-	-	-	1	2	
17	2	1	-	1	1	2	1	-	1	1	1	1	-	
18	1	1	-	1	2	1	-	2	-	2	2	1	1	
19	-	-	-	-	-	-	1	-	-	1	-	-	-	
20	-	1	-	-	1	1	2	2	1	1	1	1	-	
21	4	-	-	-	2	1	1	-	1	1	1	-	-	
22	-	3	1	1	1	1	2	1	2	1	1	-	1	
23	1	-	-	1	-	1	-	-	-	1	-	-	1	
24	2	1	-	-	2	3	-	1	1	1	-	-	-	
25	4	-	1	-	-	-	-	-	-	1	1	-	-	
26	2	2	-	1	-	1	4	1	2	2	1	-	1	
27	2	1	-	-	2	4	1	1	1	1	3	1	-	
28	4	1	1	4	1	2	1	2	4	1	2	1	1	
29	1	1	-	2	2	-	1	1	1	-	-	1	1	
30	1	-	-	2	2	1	1	-	1	-	2	-	-	
31	2	-	-	-	-	-	1	-	-	1	1	-	1	
32	1	2	1	2	2	1	2	-	1	3	-	-	-	
33	2	-	2	-	-	4	2	1	1	-	1	-	1	
34	4	1	1	4	2	1	1	2	1	1	4	1	-	
35	6	2	4	3	3	-	3	1	1	2	2	-	2	
36	-	1	1	1	1	1	-	-	1	-	-	-	-	
37	-	1	-	1	1	-	1	-	1	-	-	-	-	
38	1	-	-	1	-	-	-	-	1	-	-	-	1	
39	3	1	1	2	1	1	1	1	1	3	1	1	1	
40	1	1	1	1	-	1	-	1	2	-	1	-	-	
41	1	-	-	1	-	-	-	1	-	-	1	-	-	
42	2	1	2	1	1	-	-	1	-	-	1	-	1	
43	1	-	-	-	-	-	-	1	-	1	-	1	-	
44	2	-	2	2	1	-	1	-	2	3	1	2	1	
45	-	-	1	1	-	1	-	-	1	-	-	-	-	
46	1	-	1	1	-	-	2	-	-	-	-	-	-	
47	1	1	-	-	1	2	1	1	1	1	1	1	-	
48	-	1	1	1	3	3	2	2	3	-	1	1	3	
Average	1.5	.8	.6	1.0	1.0	1.1	1.0	.8	.9	1.0	1.1	.8	.7	

Table 9.- Difficult Homogeneous Problems Per Minute By
Members of Superior I.Q. Group

Subjects	Minutes										Rest	2	3	
	1	2	3	4	5	6	7	8	9	10				
1	4	4	6	5	2	2	4	5	5	4		4	4	5
2	2	3	4	3	3	3	2	4	4	3		4	4	3
3	2	2	3	3	3	2	3	2	4	3		4		
4	3	3	4	5	4	6	6	5	5	5		4	5	6
5	4	4	3	4	4	5	4	4	4	5		3	4	5
6	4	4	4	4	3	4	3	5	2	4		3	4	5
7	3	2	2	3	3	1	2	2	1	3		4	3	4
8	3	3	5	3	4	2	4	5	6	3		3	6	5
9	2	2	3	2	3	3	3	3	4	1		4	5	4
10	3	6	3	4	5	6	4	7	4	3		7	7	6
11	4	5	4	4	3	5	5	6	6	5		5	6	7
12	4	5	3	5	4	5	6	5	6	5		5	7	6
13	5	4	7	5	5	5	7	6	5			7	10	10
14	3	3	2	3	2	1	2	3	4	2		3	3	3
15	2	3	4	4	3	3	4	3	4	4		3	3	4
16	3	5	5	4	4	2	4	5	4	3		5	5	6
17	3	2	3	3	4	1	4	4	4	3		4	5	4
18	1	1	2	2	2	1	3	3	-	2		2	1	3
19	3	2	4	3	2	3	4	4	4	4		6	6	10
20	3	4	4	4	5	4	5	6	6	4		4	5	7
21	3	3	2	3	1	6	1	3	3	1		2	3	4
22	3	2	3	3	3	3	3	4	3	4		4	3	5
23	2	1	1	4	5	3	7	4	5	6		7	6	8
24	3	1	3	3	3	3	3	2	2	3		4	4	4
25	4	4	2	4	3	2	4	4	4	3		4	2	5
26	3	4	3	4	4	4	3	4	4	4		3	3	4
27	4	4	5	4	4	6	3	4	7	5		4	6	5
28	4	8	9	7	6	10	8	6	7	7		9	12	8
29	3	2	3	2	3	3	2	3	3	3		2	2	5
30	4	5	5	5	6	5	5	7	4	3		5	5	5
31	2	3	4	1	4	3	2	2	4	4		2	5	4
32	3	1	2	2	2	2	2	3	2	2		3	5	3
33	2	3	4	5	5	5	4	4	5	3		6	4	4
34	2	2	3	4	5	2	5	5	3	3		3	7	3
35	4	5	3	3	5	3	3	5	3	5		6	4	7
36	5	13	10	11	10	10	11	8	9	8		11		
37	7	7	4	1	5	5	6	6	4	4		8	7	9
38	1	1	3	1	2	2	3	3	2	-		5	1	4
39	3	5	5	7	6	5	5	5	5	7		6	8	8
40	3	4	4	5	2	4	3	3	3	6		5	6	5
41	1	1	2	2	1	2	1	2	2	2		2	1	1
42	4	6	6	3	5	4	7	6	5	6		6	7	8
43	6	6	5	2	6	9	8	8	9	10		11	12	10
44	4	6	5	6	5	5	6	4	5	5		8	7	6
45	4	4	6	5	6	6	7	5	6	7		9	11	10
46	5	5	4	5	5	4	6	5	6	5		7	6	6
47	1	3	3	3	2	3	3	4	4	3		4	8	4
48	3	5	5	6	6	5	5	4	3	2		6	3	4
Average	5.2	5.7	5.8	5.7	5.9	5.9	4.2	4.5	4.2	3.9		4.9	5.2	5.4

Table 10- Difficult Homogeneous Errors Per Minute By
Members of Superior I.O. Group

Subjects	Minutes										Rest	1	2	3
	1	2	3	4	5	6	7	8	9	10				
1	2	-	1	-	1	1	-	1	1	1	-	-	-	-
2	1	-	-	-	-	-	-	1	2	-	-	-	-	-
3	-	1	-	-	1	-	1	-	1	-	-	-	-	-
4	2	2	1	3	-	2	3	4	1	-	-	2	-	1
5	1	1	1	1	-	3	1	2	-	-	-	-	-	-
6	1	-	-	-	3	-	-	1	-	-	-	-	2	2
7	-	-	-	-	1	2	1	-	-	1	-	-	1	1
8	-	-	-	1	-	-	1	-	-	-	-	1	1	-
9	2	1	1	-	1	2	1	3	1	-	-	-	1	-
10	1	3	1	1	1	3	-	3	2	2	-	3	2	2
11	1	1	1	-	1	1	-	-	1	-	-	1	1	-
12	1	2	1	2	1	1	4	-	3	1	-	1	4	2
13	2	1	1	1	-	2	1	1	-	-	-	-	1	1
14	-	-	1	-	-	-	-	-	-	-	-	-	-	-
15	-	1	-	-	-	-	2	1	3	2	-	1	-	-
16	1	1	2	1	1	2	1	-	1	-	-	3	2	2
17	1	1	-	1	1	-	3	1	3	2	-	3	1	1
18	-	-	1	-	-	1	-	2	-	-	-	1	-	-
19	1	1	2	2	-	-	1	2	2	2	-	3	2	4
20	-	-	-	-	2	1	1	-	-	1	-	-	1	-
21	1	1	1	1	1	2	-	-	-	-	-	-	-	2
22	-	1	-	-	-	-	-	1	-	1	-	1	-	-
23	-	-	-	-	-	-	-	1	-	-	-	-	-	-
24	-	-	1	1	2	-	1	1	-	-	-	-	-	-
25	-	-	-	-	1	-	1	-	1	-	-	1	1	2
26	-	1	1	1	1	4	1	1	3	2	-	-	1	2
27	3	-	1	-	2	-	1	2	3	1	-	-	1	1
28	-	-	1	2	2	-	-	-	-	-	-	1	1	1
29	-	-	-	1	1	-	-	3	1	1	-	2	-	1
30	3	1	2	1	2	2	2	3	2	2	-	1	3	-
31	-	-	-	-	-	-	-	1	1	1	-	1	3	-
32	-	-	1	-	-	-	-	-	-	-	-	-	2	2
33	2	3	2	2	2	-	2	2	2	3	-	3	1	-
34	-	1	-	2	1	1	1	1	1	1	-	-	1	-
35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-	-	1	-	2	-	-
37	-	-	1	-	-	-	1	-	-	1	-	-	-	-
38	-	1	2	-	-	-	-	-	1	-	-	2	-	1
39	2	3	4	2	3	3	3	4	2	4	-	4	3	4
40	-	1	-	-	-	1	-	-	-	-	-	-	-	1
41	-	1	1	1	1	2	-	1	2	-	-	1	-	-
42	-	1	-	-	-	1	-	-	-	1	-	1	-	-
43	1	-	-	-	-	-	-	-	-	-	-	1	-	-
44	1	1	2	2	2	-	1	3	1	1	-	-	-	3
45	-	-	-	1	1	-	3	-	2	1	-	-	-	1
46	1	-	-	1	-	1	-	-	-	-	-	1	-	1
47	1	2	1	-	1	-	-	-	-	1	-	-	-	-
48	1	-	1	-	1	3	-	-	-	-	-	1	-	-
Average	.6	.7	.7	.6	.7	.8	.8	.9	.9	.7		.8	.7	.7

Table 11.--Difficult Heterogeneous Problems Per Minute By Members
Of Superior I.Q. Group

Subjects	Minutes										Rest	1	2	3
	1	2	3	4	5	6	7	8	9	10				
1	7	3	3	2	3	3	2	2	1	3	4	6	3	
2	6	4	4	1	3	2	2	1	3	2	6	4	3	
3	2	3	2	3	2	3	1	2	2	2	2	1	2	
4	7	7	7	7	7	7	7	7	5	5	7	7	7	
5	3	2	4	2	4	3	4	1	2	2	2	4	4	
6	3	5	5	3	4	3	5	3	4	4	5	6	5	
7	5	3	3	4	3	4	3	4	4	6	5	3	4	
8	3	4	4	1	2	4	3	2	1	3	3	3	5	
9	4	5	6	5	3	2	4	4	4	7	2	7	4	
10	3	6	5	7	4	5	5	6	5	5	4	5	3	
11	8	6	6	4	3	5	6	8	5	4	3	5	3	
12	5	7	4	5	5	6	6	8	6	6	6	8	5	
13	4	6	6	4	4	5	7	7	7	5	4	6	5	
14	3	2	4	2	2	2	1	4	2	2	2	4	3	
15	5	4	3	3	4	5	1	4	4	5	2	3	5	
16	2	4	4	5	5	4	3	4	5	8	5	5	4	
17	5	2	1	5	3	3	4	2	3		2	5	3	
18	4	4	6	2	4	2	3	2	3	3	5	6	2	
19	3	3	2	3	3	2	2	5	2	2	2	3	3	
20	1	4	5	4	1	3	3	3	1	4	4	2	5	
21	4	6	6	6	5	5	8	6	6	7	5	7	7	
22	5	4	3	2	4	4	3	4	4	3	4	4	3	
23	3	4	5	3	5	3	5	4	7	6	4			
24	2	2	3	3	4	4	4	3	1	5	4	5	4	
25	5	3	5	5	5	2	4	5	3	5	5	6	4	
26	3	5	4	4	3	4	2	4	3	3	4	3	4	
27	5	5	5	7	6	6	6	9	5	6	6	5	5	
28	8	6	6	3	4	4	3	4	6	4	4	4	6	
29	4	5	4	2	4	2	2	2	2	2	1	1	3	
30	6	4	4	3	5	2	2	5	3		6	4	4	
31	2	2	3	2	1	2	2	3	2	3	3	4	3	
32	4	4	4	2	3	4	3	3	3	4	5	5	4	
33	4	4	4	5	4	6	5	7	5	5	7	4	5	
34	5	3	5	5	5	5	3	2	7	3	3	4	3	
35	6	3	4	5	5	3	3	4	2	3	4	4	4	
36	6	4	7	4	5	5	5	4	6		5	3	2	
37	5	5	4	5	4	4	4	5	7	5	5	5	4	
38	5	3	5	4	5	5	4	3	7	5	6	6	4	
39	4	4	4	4	4	3	2	5	4	6	5	5	6	
40	2	6	6	4	5	3	3	4	7	7	7	5	5	
41	3	3	2	3	2	2	3	2	2	1	2	2	3	
42	4	5	5	4	4	3	3	6	5	4	3	4	4	
43	3	3	5	3	3	3	2	2	3	3	3	3	6	
44	7	7	5	5	4	6	6	6	7	6	6	6	3	
45	6	4	3	4	4	3	4	3	3	5	4	5	5	
46	4	5	4	3	6	3	3	5	3	8	4	6	4	
47	6	4	4	2	3	3	2	4	2	4	4	5	4	
48	5	4	4	4	4	4	4	4	4	5	5	2	2	
Average	4.3	4.1	4.3	3.6	3.8	3.6	3.6	4.1	3.9	4.3	4.1	4.4	4.0	

Table 12.- Difficult Heterogeneous Errors Per Minute By Members Of Superior I.Q. Group

Subjects	Minutes										Rest		
	1	2	3	4	5	6	7	8	9	10	1	2	3
1	-	1	1	-	2	1	-	-	1	2	1	1	-
2	-	-	1	-	2	1	1	-	-	-	2	1	-
3	1	-	-	1	1	1	-	1	-	1	-	1	-
4	3	3	4	3	3	2	2	1	2	3	4	5	5
5	1	-	1	1	1	1	1	-	-	-	-	2	1
6	-	-	-	-	-	-	-	1	1	1	-	-	1
7	1	-	1	-	1	1	1	1	2	2	4	1	1
8	1	-	-	1	1	-	1	2	-	2	-	1	2
9	1	2	1	2	1	-	1	-	4	1	1	2	-
10	2	-	-	3	2	1	3	1	1	-	1	2	1
11	1	1	3	2	1	2	2	4	1	1	-	2	1
12	1	2	3	2	2	1	3	3	2	-	3	5	4
13	2	-	2	-	1	2	1	2	1	1	1	3	2
14	2	1	2	-	-	-	-	-	-	-	-	2	-
15	1	-	2	1	2	1	1	1	1	-	1	1	-
16	2	1	1	1	-	1	1	3	2	2	-	3	1
17	-	2	-	2	2	2	2	-	1	-	-	1	1
18	1	1	3	-	1	1	-	-	2	-	1	-	-
19	1	2	-	1	2	1	-	3	-	1	-	1	-
20	-	1	1	1	-	1	2	1	-	1	1	-	-
21	2	1	1	1	2	2	2	1	3	-	2	2	1
22	-	-	-	-	2	2	-	3	2	1	2	2	1
23	-	-	-	-	1	1	-	1	-	1	1	-	-
24	1	-	1	-	2	-	1	-	-	1	-	1	1
25	-	-	1	1	-	-	1	1	-	2	1	-	-
26	1	1	2	-	2	3	1	1	1	1	1	1	1
27	1	3	2	4	1	2	3	3	2	2	3	1	2
28	-	2	1	2	-	2	2	1	-	-	1	-	1
29	2	2	3	1	3	2	1	-	1	-	1	-	1
30	-	3	1	-	2	-	1	1	-	-	1	1	1
31	-	1	1	-	-	1	-	1	1	1	H	-	2
32	2	2	-	-	-	2	1	-	-	1	1	1	1
33	1	1	-	2	-	2	2	5	-	3	1	-	4
34	1	2	1	1	2	-	2	-	2	-	1	1	-
35	-	2	1	2	2	1	-	1	-	1	2	1	-
36	1	-	2	2	1	3	2	-	1	2	2	2	-
37	1	1	1	1	1	1	2	-	1	2	-	1	1
38	1	1	1	-	1	-	1	-	-	-	1	1	2
39	1	3	1	3	2	2	-	4	1	2	3	2	2
40	-	-	-	1	1	1	-	-	-	-	-	-	1
41	1	2	-	1	2	2	2	1	1	-	1	-	1
42	2	-	-	1	1	-	1	-	1	-	-	1	-
43	1	-	1	-	1	1	-	-	-	-	1	-	1
44	2	3	4	1	3	3	2	2	2	1	5	6	1
45	2	1	1	-	1	-	1	-	-	1	-	-	1
46	1	-	1	1	-	1	-	-	1	-	-	-	-
47	2	1	-	-	-	2	-	-	1	1	1	1	1
48	1	-	2	1	2	1	2	2	3	1	2	1	-
Average	.9	1.0	1.1	.9	1.2	1.2	1.0	1.0	.9	.8	1.1	1.2	1.0

Table 13.- Superior I.Q. Group. Decrement in Homogeneous Easy Problems

Subj- ects	N/MI	N/M2	Chge.	%Chge.	PE/MI	PE/M2	%EI	%E2	Chge. %E	%Chge. %E
1	4.33	5.00	.67	15.4	-	-	-	-	-	0.0
2	11.00	14.00	3.00	27.2	.33	-	3.0	-	3.0	-100.0
3	6.00	7.33	1.33	22.1	1.00	.33	16.6	4.5-12.1	-	-72.8
4	7.67	12.00	4.33	56.4	.33	.67	4.3	5.5	1.2	27.9
5	6.50	8.67	2.17	28.9	1.00	.67	15.3	7.7-7.6	-	-49.6
6	7.00	9.00	2.00	28.5	1.67	1.33	24.0	14.7-9.3	-	-38.7
7	5.33	9.67	4.33	81.2	-	-	-	-	-	0.0
8	6.33	9.67	3.33	58.0	1.00	.33	15.7	3.4-12.3	-	-78.5
9	6.33	8.67	2.33	36.8	1.33	-	21.0	-	-21.0	-100.0
10	9.33	10.0	.67	7.1	1.67	1.00	17.8	10.0-7.8	-	-43.8
11	7.67	9.67	2.00	26.4	1.00	-	13.0	-	-13.0	-100.0
12	6.33	8.33	2.00	31.5	1.00	.67	17.9	8.0-9.9	-	-55.3
13	9.00	12.00	3.00	33.3	.67	.67	7.4	5.5-3.9	-	-52.7
14	7.33	8.00	.67	9.1	1.00	-	13.9	-	-13.9	-100.0
15	6.00	7.33	1.33	22.1	2.00	.33	35.3	4.5-28.8	-	-86.4
16	6.33	10.67	4.33	75.2	.67	.33	10.5	3.0-7.5	-	-71.4
17	8.67	13.00	4.33	49.9	-	-	-	-	-	0.0
18	6.33	8.00	1.67	26.3	.67	.67	10.6	8.3-2.3	-	-21.6
19	5.00	8.00	3.00	60.0	.33	.67	6.6	8.3	1.7	25.7
20	15.33	16.33	1.00	6.5	-	-	-	-	-	0.0
21	5.00	7.00	2.00	40.0	.33	-	6.6	-	-6.6	-100.0
22	5.67	7.67	2.00	35.2	.33	.33	5.8	4.3-1.5	-	-25.8
23	9.00	10.33	1.33	14.7	-	-	-	-	-	0.0
24	5.67	8.67	3.00	52.9	.33	.33	5.8	3.8-2.0	-	-34.4
25	9.33	11.00	1.67	17.8	.33	-	3.5	-	3.5	-100.0
26	7.67	7.67	0.00	0.0	.33	.67	4.3	8.7	4.4	102.3
27	10.33	12.33	2.00	19.3	.67	.33	6.3	2.6-3.7	-	-58.7
28	14.33	15.33	1.00	6.9	.67	1.33	4.6	8.6	4.0	86.9
29	10.67	14.33	3.67	34.3	-	-	-	-	-	0.0
30	13.00	15.00	2.00	15.3	-	1.33	-	8.8	8.8	100.0
31	5.67	8.00	2.33	41.0	.33	1.33	5.8	16.6	10.8	186.2
32	6.33	9.67	3.33	52.6	.33	.33	5.5	3.4-2.1	-	-38.1
33	8.00	9.33	1.33	16.6	1.50	-	18.7	-	-18.7	-100.0
34	8.00	9.33	1.33	16.6	1.00	1.67	12.5	17.8	5.3	42.4
35	10.67	11.67	1.00	9.3	.33	1.00	3.0	8.5	6.5	183.0
36	8.33	12.50	4.17	50.0	-	-	-	-	-	0.0
37	10.00	10.50	.50	50.0	2.00	1.00	20.0	9.5-11.5	-	-57.5
38	9.00	13.00	4.00	44.4	.33	-	3.6	-	-3.6	-100.0
39	6.67	8.33	1.67	25.0	.67	.67	10.0	8.0-2.0	-	-20.0
40	9.33	9.33	-1.00	-10.7	-	-	-	-	-	0.0
41	5.00	5.33	.33	6.6	1.00	1.33	20.0	24.9	4.9	24.5
42	10.33	14.67	4.33	41.9	-	-	-	-	-	0.0
43	5.00	8.67	3.67	73.4	.33	.67	6.6	7.7	1.1	16.6
44	8.33	10.50	2.17	26.0	.33	.50	3.9	4.7	.8	20.5
45	5.67	6.67	1.00	17.7	1.00	.33	17.6	4.9-12.7	-	-72.1
46	13.67	13.33	-.33	-2.4	-	-	-	-	-	0.0
47	4.00	15.33	1.33	33.2	.50	2.00	12.5	37.5	25.0	200.0
48	9.33	12.33	3.00	32.1	1.00	.33	10.7	2.6-8.1	-	-75.7

Table 15.- Superior I.Q. Group Decrement in Heterogeneous Easy Problems

Subj- ects	N/MI	N/M2	Chge.	%Chge.	PE/MI	PE/M2	%EI	%E2	Chge. %E	%Chge. %E
1	4.00	5.33	1.33	33.2	1.33	-	33.2	-	-33.2	-100.0
2	7.00	6.33	-.67	-9.5	2.00	4.00	28.5	63.1	35.6	117.8
3	4.67	6.00	1.33	28.4	.67	1.33	14.3	24.0	9.7	67.8
4	9.00	13.33	4.33	48.1	2.00	2.67	22.2	21.0	-2.2	-9.9
5	6.33	8.33	2.00	33.1	.33	-	5.3	-	-5.3	-100.0
6	5.00	6.00	1.00	20.0	1.00	1.00	20.0	16.6	-3.4	-17.0
7	4.00	5.67	1.67	41.7	-	1.33	-	23.4	23.4	100.0
8	4.67	5.67	1.00	21.4	1.33	1.33	28.4	23.4	-5.0	-17.6
9	5.00	4.33	-.67	-13.4	2.00	1.33	40.0	30.7	-9.3	-23.2
10	6.67	5.67	-1.00	-14.9	1.00	.33	14.9	5.8	-9.1	-61.0
11	6.00	6.00	-	0.0	.33	.67	5.5	11.1	5.6	101.8
12	7.00	9.67	2.67	38.1	1.00	1.00	14.6	10.3	-4.3	-29.4
13	7.67	8.50	.83	10.8	1.00	1.50	13.1	17.6	4.5	34.3
14	5.67	5.67	-	0.0	.33	1.67	5.8	29.4	23.6	406.8
15	7.00	6.67	-.33	-4.7	.67	.33	9.5	4.9	-4.6	-48.4
16	3.67	6.67	-	0.0	.33	1.00	4.9	14.9	10.0	204.0
17	7.33	9.00	1.67	22.7	.67	.67	9.1	7.4	-1.7	-18.6
18	4.33	5.00	.67	15.4	1.33	1.33	30.7	26.6	-4.1	-13.3
19	3.67	7.00	3.33	90.7	.33	-	8.9	-	-8.9	-100.0
20	7.67	8.00	.33	4.6	1.33	1.00	17.9	12.5	-5.4	-30.1
21	5.00	4.33	-.67	-13.4	.67	.33	13.4	7.6	-5.8	-43.2
22	3.67	4.67	1.00	27.2	1.33	.67	36.2	14.3	-21.9	-60.4
23	6.67	5.67	-1.00	-15.3	.33	.33	4.9	5.8	0.9	18.3
24	4.33	5.00	.67	15.4	1.00	-	23.0	-	-23.0	-100.0
25	5.33	5.00	-.33	-6.1	.33	.33	6.1	6.6	.5	8.1
26	3.33	3.67	.33	9.1	1.67	.67	50.1	18.2	-31.9	-65.6
27	6.00	8.00	2.00	33.3	1.00	1.33	16.6	16.6	-	0.0
28	7.00	7.33	.33	4.7	2.00	1.33	29.1	18.1	-9.0	-30.9
29	3.00	4.00	1.00	33.3	.67	.67	22.3	16.7	-5.6	-25.1
30	8.00	8.33	.33	4.1	.33	.67	4.1	8.0	3.9	95.1
31	5.00	4.67	-.33	-6.6	.33	.67	6.6	14.3	7.7	116.6
32	4.33	4.67	.33	7.6	1.33	-	30.7	-	-30.7	-100.0
33	5.00	5.67	.67	15.4	.67	.67	13.4	11.8	-1.6	-11.9
34	6.00	8.00	2.00	33.3	1.33	2.50	22.1	31.2	9.1	41.1
35	6.33	7.00	.67	12.5	1.33	1.33	21.0	19.0	-2.0	-9.5
36	7.67	6.00	-.67	-8.9	.33	-	4.6	-	-4.6	-100.0
37	6.33	8.00	1.67	28.6	.33	-	5.2	-	-5.2	-100.0
38	7.33	7.00	-.33	-4.5	.33	.33	4.5	4.9	.4	88.8
39	4.67	4.00	-.67	-14.3	1.33	1.00	28.4	25.0	-3.4	-11.9
40	6.67	8.67	2.00	29.9	1.00	.33	14.9	33.8	-11.1	-74.4
41	3.00	3.00	-	0.0	.50	.33	16.6	11.0	-5.6	-35.7
42	10.00	13.33	3.33	33.3	.33	.67	3.3	5.0	1.7	51.5
43	7.33	11.00	3.67	50.0	.67	.50	9.5	4.5	-5.0	-52.6
44	6.67	7.67	1.00	14.9	1.67	1.33	25.0	17.7	-7.3	-29.2
45	8.00	8.00	-	0.0	.50	-	6.2	-	-6.2	-100.0
46	5.33	6.67	1.33	24.9	-	-	-	-	-	0.0
47	4.00	6.33	2.33	58.2	1.00	.67	25.0	10.5	-14.5	-58.0
48	9.67	10.00	.33	3.4	1.67	1.67	17.2	16.7	-.5	-29.0

Table 16.- Superior I.Q. Group Decrement in Homogeneous Difficult Problems.

Subj- ects	N/MI	N/M2	Chge.	%Chge.	PE/MI	PE/M2	%EI	%E2	Chge. %E	%Chge %E
1	4.00	3.67	-.33	-8.2	1.00	-	25.0	-	-25.0	-100.0
2	3.67	3.67	-	0.0	1.00	-	17.2	-	-17.2	-100.0
3	3.00	4.00	1.00	33.3	.33	-	11.0	-	-11.0	-100.0
4	5.00	5.00	-	0.0	1.67	1.00	33.4	20.0	-13.4	-38.9
5	4.33	4.00	-.33	-7.6	.67	-	15.4	-	-15.4	-100.0
6	3.67	4.00	.33	10.7	.33	1.33	8.9	33.2	24.3	273.0
7	4.67	4.67	-	0.0	.33	.67	7.0	14.3	7.3	104.4
8	2.00	3.67	1.67	83.5	-	.67	-	18.2	18.2	100.0
9	2.67	4.33	1.67	62.5	1.33	.33	49.8	7.6	-42.2	-84.7
10	4.67	6.67	2.00	42.8	2.33	2.33	49.8	34.9	-14.9	-29.9
11	5.67	6.00	.33	5.8	.33	.67	5.8	11.1	5.3	91.3
12	5.33	6.00	.67	12.5	1.33	1.67	24.9	27.8	2.9	11.6
13	5.50	9.00	3.50	63.6	.50	.67	9.0	7.4	-1.6	-17.7
14	3.00	3.00	-	-	-	-	-	-	-	0.0
15	3.67	3.33	-.33	-8.9	2.00	.33	54.4	9.9	-44.5	-81.8
16	4.00	5.33	1.33	33.2	.33	1.33	8.2	24.9	16.7	203.6
17	3.67	4.33	.67	18.2	2.00	1.67	54.4	38.5	-15.9	-29.2
18	1.67	2.00	.33	19.7	.67	.33	40.1	16.5	-23.6	-58.8
19	4.00	7.33	3.33	83.2	2.00	3.00	50.0	42.4	-7.6	-15.2
20	5.33	5.67	.33	6.1	.33	.33	6.1	5.8	-.3	-4.9
21	2.33	3.00	.67	28.7	-	.67	-	22.3	22.3	100.0
22	3.67	4.00	.33	8.9	.67	.33	18.2	8.2	-10.0	-54.9
23	5.00	7.00	2.00	40.0	-	-	-	-	-	0.0
24	2.33	4.00	1.67	71.6	.33	-	14.1	-	-14.1	-100.0
25	3.67	3.67	-	-	.33	1.33	8.9	36.2	27.3	306.7
26	4.00	3.33	-.67	-16.7	2.00	1.00	50.0	30.0	-20.0	-40.0
27	5.33	5.00	-.33	-6.1	2.33	.67	45.7	13.4	-30.3	-69.3
28	6.67	9.67	3.00	44.9	-	1.00	-	10.3	10.3	100.0
29	3.00	3.00	-	-	1.67	1.33	55.6	44.3	-11.3	-20.3
30	4.67	5.00	.33	7.0	3.33	1.33	71.3	26.6	-44.7	-62.6
31	3.33	3.67	.33	9.9	1.00	1.33	30.0	36.2	6.2	20.6
32	2.33	3.67	1.33	57.0	-	1.33	-	36.2	36.2	100.0
33	4.00	4.67	.67	16.7	2.33	1.33	58.2	28.4	-29.8	-51.2
34	3.67	5.33	1.67	45.4	1.00	.33	27.2	6.1	-21.1	-77.6
35	4.33	5.67	1.33	30.7	-	-	-	-	-	0.0
36	8.33	11.00	2.67	32.0	.33	2.00	3.9	18.1	14.2	364.1
37	4.67	8.00	3.33	71.3	.33	-	7.0	-	-7.0	-100.0
38	1.67	3.67	2.00	119.7	.33	1.00	19.7	27.2	7.5	38.0
39	5.67	7.33	1.67	29.4	3.33	3.67	58.7	50.0	-8.7	-14.8
40	4.00	5.33	1.33	33.2	-	.33	-	6.1	6.1	100.0
41	2.00	1.33	-.67	-33.5	1.00	.33	50.0	24.8	-25.2	-50.4
42	5.67	7.00	1.33	23.4	.33	.33	5.8	4.7	-1.1	-18.9
43	9.00	11.00	2.00	22.2	-	.33	-	3.0	3.0	100.0
44	4.67	7.00	2.33	49.8	1.67	1.00	35.7	16.1	-19.6	-54.9
45	6.00	10.00	4.00	66.6	1.00	.33	16.6	3.3	-13.3	-80.1
46	5.33	6.33	1.00	18.7	-	.67	-	10.5	10.5	100.0
47	3.67	5.33	1.67	45.00	.33	-	8.9	-	-8.9	-100.0
48	3.00	4.33	1.33	30.0	-	.33	-	7.6	7.6	100.0

Table 17.- Superior I.Q. Group Decrement In Heterogeneous Difficult Problems

Sub-jects	N/M1	N/M2	Chge.	%Chge.	E/M1	E/M2	%E1	%E2	Chge. %E	%Chge. %E
1	2.00	4.33	2.33	116.0	1.00	.67	50.0	15.2	-34.8	- 6 9.6
2	2.00	4.33	1.33	66.5	-	1.00	-	25.0	25.0	100.0
3	2.00	1.67	-.55	- 16.5	.67	-	33.0	-	-33.0	- 100.0
4	5.67	7.00	1.33	23.4	2.00	4.67	35.2	66.7	31.5	89.4
5	1.67	3.33	1.67	100.0	0.00	1.00	-	30.0	30.0	100.0
6	5.00	5.33	.33	6.6	1.00	.33	20.0	6.1	-13.9	- 69.5
7	4.67	4.00	-.67	- 14.3	1.67	2.00	35.7	50.0	14.3	40.0
8	2.00	3.67	1.67	83.5	1.33	1.00	66.5	27.2	-39.3	- 59.0
9	5.00	4.33	-.67	- 13.4	1.67	1.00	33.4	25.0	-10.4	- 31.1
10	5.33	4.00	-.33	- 6.1	.67	1.33	12.5	33.2	10.7	85.6
11	5.67	3.67	-2.00	- 35.2	2.00	1.00	35.2	27.2	- 5.0	- 14.2
12	6.67	6.33	-.33	- 5.4	1.67	4.00	25.0	63.1	38.1	152.4
13	6.33	5.00	-.33	- 5.2	1.33	2.00	21.0	40.0	19.0	90.4
14	2.67	3.00	.33	12.3	-	.67	-	22.3	22.3	100.0
15	4.33	3.33	-1.00	- 23.0	.67	.67	15.4	20.1	4.7	30.5
16	5.67	4.67	-1.00	- 17.6	2.33	1.33	41.0	28.4	-12.6	- 30.7
17	2.50	3.33	.83	33.2	.50	.67	20.0	20.1	.1	.5
18	2.67	4.33	1.67	62.5	.67	.33	25.0	7.6	-17.4	- 69.3
19	3.00	2.67	-.33	- 11.0	1.33	.33	44.3	12.3	-32.0	- 72.2
20	2.67	3.67	1.00	37.4	.67	.33	25.0	8.9	-16.1	- 64.1
21	6.33	6.33	-	0.0	1.33	1.67	21.0	26.3	5.3	25.2
22	3.67	3.67	-	0.0	2.00	1.67	54.4	45.5	- 4.9	- 9.0
23	5.67	4.00	-1.67	- 29.4	.67	1.00	11.8	25.0	13.2	111.8
24	3.00	4.33	1.33	44.3	.33	.67	11.0	15.4	4.4	40.0
25	4.33	5.00	.67	15.4	.67	.33	13.4	6.1	- 7.5	- 54.4
26	3.33	3.67	.33	9.9	1.00	1.00	30.0	27.2	- 2.8	- 9.3
27	6.67	5.33	-1.33	- 21.6	2.33	2.00	34.9	37.5	2.6	7.4
28	4.67	4.67	-	0.0	.33	.67	7.0	14.3	7.3	104.2
29	2.00	1.67	-.33	- 16.5	.33	.67	16.5	39.9	23.4	141.8
30	4.00	4.67	.67	16.7	.50	1.00	12.5	21.4	8.9	71.2
31	2.67	3.33	.67	25.0	1.00	1.00	37.4	30.0	- 7.4	- 19.7
32	3.33	4.33	1.00	30.0	.33	1.00	9.9	25.0	13.1	152.3
33	5.67	5.33	-.33	- 5.8	2.67	1.67	47.0	31.5	-15.7	- 33.4
34	4.00	3.33	-.67	- 16.7	.67	.67	16.7	20.1	3.4	20.5
35	3.00	4.00	1.00	33.3	.67	1.00	22.5	25.0	2.7	12.1
36	5.00	3.33	-1.67	- 33.4	.50	1.33	10.0	39.9	29.9	299.0
37	5.67	4.67	-1.00	- 17.6	1.00	.67	17.6	14.3	- 3.3	- 18.7
38	5.00	5.33	.33	6.6	-	1.33	-	24.9	24.9	100.0
39	5.00	5.33	.33	6.6	2.33	2.33	4 6.6	32.4	15.8	33.9
40	6.00	5.67	-.33	- 6.6	-	.33	-	5.8	5.8	100.0
41	1.67	2.33	.67	40.1	.67	.67	40.1	28.7	-11.4	- 28.4
42	5.00	3.67	-1.33	- 26.6	.33	.33	6.6	8.9	2.3	34.8
43	2.67	4.00	1.33	49.8	-	.67	-	16.7	16.7	100.0
44	6.33	5.00	-1.33	- 21.0	1.67	4.00	26.6	80.0	51.4	179.7
45	3.67	4.67	1.00	27.2	.33	.33	8.9	7.0	- 1.9	- 21.3
46	5.33	4.67	-.67	- 12.5	.33	-	6.1	-	- 6.1	- 100.0
47	3.33	4.33	1.00	30.0	.67	1.00	2 0.1	23.0	2.9	14.4
48	4.33	3.00	-1.33	- 30.7	2.00	1.00	46.1	35.3	-12.8	- 27.7

Table 18.- Easy Homogeneous Problems Per Minute by Members of Normal I.Q. Group

Subjects	Minutes													
	1	2	3	4	5	6	7	8	9	10	Rest	1	2	3
1	3	4	3	7	6	7	5	3	5	7		6	3	7
2	11	7	5	6	10	3	6	7	8	9		8	8	9
3	9	11	10	9	10	12	9	12	12	13		19	20	20
4	10	6	8	10	7	9	7	10	7	7		11	12	
5	11	14	17	14	14	13	16	9	15	12		14	22	20
6	4	4	6	7	5	6	8	6	6	4		12	12	15
7	10	12	9	9	7	8	10	8	8	5		8	6	9
8	9	7	6	6	6	8	8	3	7	8		9	6	9
9	11	11	11	8	11	8	11	10	7	9		15	15	16
10	6	6	11	12	8	12	11	12	12	13		13	16	15
11	9	8	10	11	11	10	14	12	15	11		19	22	21
12	12	16	10	9	9	8	8	8	10	10		10	11	14
13	9	7	8	9	6	8	5	8	9	10		13		
14	15	12	12	14	14	15	12	13	9	9		14	15	17
15	15	14	12	12	12	12	11	10	11	11		14	16	23
16	15	14	11	10	12	12	12	13	9	11		17	19	19
17	9	9	8	7	6	6	7	9	9	9		9	11	11
18	9	11	11	11	12	12	13	11	15	10		14	14	11
19	11	11	11	7	8	11	15	18	16			26	27	15
20	11	10	13	13	11	13	14	14	11	15		17	16	15
21	14	16	16	15	12	13	12	11	11	12		20	16	18
22	16	12	12	15	12	15	13	13	11	14		18	19	17
23	13	12	12	10	8	11	12	13	13			12	14	11
24	8	7	5	8	5	5	7	9	11	14		16	14	
25	7	5	5	5	7	5	4	5	5	5		11	12	8
26	14	17	15	17	13	20	13	16	21	24		25	23	
27	7	11	10	10	6	10	13	12	9	9		14	11	16
28	4	5	6	6	7	4	8	5	5	8		8	9	8
29	10	12	13	11	15	19	16	15	15	17		16	22	20
30	7	7	8	10	10	12	13	13	12	10		12	15	17
31	9	7	8	8	5	8	8	12	10	14		14	13	11
32	9	7	11	14	14	15	16	14	11	13		16	16	17
33	7	8	8	4	4	6	6	10	9	11		12	10	10
34	7	5	5	5	8	7	7	7	8	8		9	10	8
35	13	12	12	13	14	16	13	18	14	17		16	17	21

Table 19- Easy Homogeneous Errors Per Minute by Members of Normal I.Q. Group

Subjects	Minutes													
	1	2	3	4	5	6	7	8	9	10	Rest	1	2	3
1	1	1	1	1	-	3	3	-	4	2		1	-	1
2	3	1	1	2	1	-	1	-	-	-		1	1	1
3	-	-	2	-	-	-	2	-	1	-		1	-	-
4	1	2	-	-	1	-	-	2	-	-		1	-	-
5	1	-	-	1	1	-	1	2	1	-		1	5	4
6	-	-	1	1	-	-	-	-	-	-		1	-	2
7	-	1	-	1	1	1	2	1	-	1		1	-	-
8	-	1	-	-	-	1	4	-	2	2		1	2	2
9	3	1	1	2	-	5	3	2	1	4		-	-	2
10	-	-	-	-	-	-	-	1	2	-		1	-	-
11	-	1	-	-	1	-	1	-	1	2		3	-	-
12	1	1	-	-	-	-	-	-	2	-		2	1	1
13	1	2	4	2	-	3	1	-	1	-		-	-	-
14	1	-	-	-	-	-	1	3	2	1		-	-	-
15	1	3	1	1	1	3	2	2	-	-		3	1	2
16	-	-	-	-	-	-	3	-	-	-		-	-	-
17	-	1	-	1	-	1	-	1	1	2		3	1	-
18	-	3	1	-	-	1	2	1	-	-		-	-	1
19	-	-	-	-	-	-	-	-	-	1		-	3	-
20	-	1	-	-	-	1	1	-	-	-		1	-	-
21	5	-	2	2	3	3	1	1	1	1		-	-	1
22	3	2	-	-	-	-	2	-	-	-		-	4	-
23	-	-	-	-	-	-	-	1	-	-		-	-	-
24	-	-	1	1	-	1	-	1	-	-		2	-	-
25	-	-	-	-	-	-	-	-	-	-		-	-	-
26	-	-	-	1	-	-	1	-	-	-		-	2	-
27	2	1	3	-	1	-	-	-	-	-		-	-	-
28	-	-	-	-	-	-	-	-	-	-		-	-	-
29	1	-	-	1	-	-	-	-	-	1		1	-	1
30	-	-	-	-	-	-	-	-	-	-		-	-	-
31	-	-	-	-	-	-	-	-	-	-		-	-	-
32	-	-	1	-	-	-	1	-	-	-		-	-	-
33	-	2	3	1	3	2	2	3	1	1		3	3	2
34	1	1	2	2	-	3	2	1	1	-		-	4	1
35	-	4	5	6	7	8	4	9	3	6		1	2	6

Table 20.- Easy Heterogeneous Problems Per Minute by Members of Normal I.Q. Group

Subjects	Minutes										Rest		
	1	2	3	4	5	6	7	8	9	10	1	2	3
1	10	6	7	7	9	11	7	7	9		10	10	
2	9	4	8	8	4	10	7	8	9	10	11	6	7
3	4	6	8	7	10	5	6	4	8	6	6	5	10
4	6	7	5	5	5	7	7	7	11	7	10	10	7
5	4	6	2	4	5	3	4	3	3	4	4	5	4
6	13	8	9	9	11	8	8	7	5	10	10	10	
7	15	14	16	13	13	16	11	11	15	14	14	9	14
8	12	15	12	11	13	14	15	12	14	10	13	15	11
9	13	9	10	11	7	12	9	13	9	7	15	15	14
10	7	7	4	5	5	7	9	6	9	7	11	9	10
11	12	9	7	8	10	8	9	8	9	7	10	9	15
12	13	11	11	11	10	13	14	13	12	13	15	17	15
13	13	9	14	12	9	11	12	8	9	12			
14	5	6	4	2	6	6	7	8	13	6	10	5	8
15	11	7	5	7	8	8	11	10	8	11	9	13	12
16	9	8	6	8	4	6	9	9	8	7	14	8	10
17	12	9	9	6	10	10	9	10	8	6	9	11	13
18	13	8	10	13	12	13	12	12	12	14	15	19	20
19	12	11	11	10	8	9	8	9	9	8	16	16	12
20	7	6	5	7	7	6	8	7	9	6	12	10	8
21	13	7	8	9	11	10	8	11	10	10	19	15	13
22	22	17	21	19	18	12	16	20	20	17	25		
23	7	6	7	4	5	6	6	7	5	7	4	5	4
24	9	11	10	11	11	11	12	12	14		17	19	18
25	13	9	8	8	12	9	6	8	9	7	10	12	17
26	14	11	10	10	10	7	9	11	11	7	6	8	14
27	10	8	10	13	11	13	11	12	9	11	23	17	17
28	11	5	4	5	7	7	8	6	6	8	8	6	7
29	11	8	9	8	11	8	11	13	11	7	11	14	11
30	5	2	3	3	2	6	5	8	7	7	12	10	11
31	14	9	15	15	8	9	11	10	11	10	15	16	15
32	11	8	5	5	6	9	6	7	9	5	8	10	9
33	13	6	11	12	8	11	10	14	7	9	17	13	16
34	11	4	7	7	7	8	8	7	5	11	11	13	14
35	10	9	8	9	8	8	10	7	12	9	11	14	13

Table 21.- Easy Heterogeneous Errors Per Minute by Members of Normal I.Q. Group

Subjects	Minutes										Rest		
	1	2	3	4	5	6	7	8	9	10	1	2	3
1	-	-	-	-	-	-	-	-	-	-	-	1	-
2	-	2	3	4	1	2	2	1	1	1	1	2	-
3	2	1	1	1	2	2	3	1	-	-	1	-	-
4	-	1	-	-	1	-	1	-	-	-	2	-	1
5	2	2	2	3	4	1	2	1	3	4	1	3	3
6	-	-	-	-	-	1	-	-	-	1	-	-	-
7	1	1	-	-	1	1	1	-	-	-	-	-	-
8	1	1	1	2	2	3	-	-	-	-	2	2	1
9	1	1	2	3	-	1	-	2	1	1	-	-	2
10	-	1	-	1	1	-	1	1	1	-	2	1	2
11	1	3	2	1	1	1	1	1	1	2	1	-	-
12	-	1	-	-	1	-	2	2	1	-	1	-	1
13	1	1	1	2	4	-	1	-	-	-	-	1	-
14	2	-	3	-	1	1	4	7	9	3	-	3	1
15	-	2	-	2	-	2	2	1	3	1	-	1	-
16	1	1	-	1	-	-	1	2	-	2	4	1	1
17	-	1	2	-	2	1	-	2	-	2	-	1	1
18	-	-	-	-	-	1	-	-	-	-	-	-	-
19	-	2	2	1	1	2	2	1	-	2	2	2	2
20	-	-	-	-	1	-	-	-	-	-	-	-	-
21	-	1	3	-	3	5	-	4	-	2	-	6	5
22	-	1	2	1	-	-	-	1	-	3	3	-	-
23	1	4	2	4	4	4	4	6	5	7	2	4	2
24	-	-	-	-	1	2	-	-	1	-	-	-	-
25	-	-	-	1	-	-	-	-	1	1	1	-	-
26	-	-	2	-	-	2	-	-	-	-	1	-	1
27	-	-	-	-	-	1	-	-	1	-	-	1	-
28	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	1	-	-	-	1	-	3	1	-	1	-	1
30	-	-	1	1	1	3	2	1	1	2	2	2	1
31	-	1	-	1	1	-	-	-	1	-	-	1	-
32	-	-	-	-	-	-	-	-	-	-	-	-	-
33	-	1	2	1	2	2	2	3	1	-	-	2	2
34	-	2	1	2	-	1	2	2	1	2	2	1	2
35	1	2	2	-	-	2	2	-	3	1	1	-	2

Table 22.- Difficult Homogeneous Problems Per Minute by Members of Normal I.Q. Group

Subjects	Minutes										Rest	1	2	3
	1	2	3	4	5	6	7	8	9	10				
1	7	7	9	10	7	7	7	7	6	6		8	8	7
2	2	3	8	8	8	7	5	5	6	5		4	4	6
3	1	2	3	1	3	3	4	5	5	1		2	6	2
4	4	5	4	3	5	3	5	5	3	4		5	5	5
5	7	6	5	3	4	6	5	5	3	3		5	4	5
6	6	8	6	6	9	6	9	7	6	5		9	9	9
7	5	6	6	7	5	6	4	6	8	6		8	6	7
8	7	8	10	8	8	8	8	5	7	6		6	7	8
9	11	10	8	8	10	7	9	9	9	7		9	8	12
10	2	2	5	2	2	-	4	4	1	4		4	4	4
11	6	6	6	7	7	7	5	7	7	5		9	10	11
12	4	10	10	11	10	10	10	10	13	10		12	12	12
13	4	8	8	8	7	5	8	8	6	6		9	10	9
14	4	5	4	3	4	5	5	5	2	4		6	5	5
15	6	6	7	7	7	6	6	6	4	3		6	4	5
16	7	7	7	8	7	8	7	6	7	6		12	10	9
17	6	6	6	8	8	7	8	8	8	5		11	9	11
18	9	8	9	10	9	8	8	10	10	6		12	12	14
19	6	6	5	4	4	7	6	6	5	3		8	8	5
20	5	4	5	5	5	6	4	6	3	5		6	3	5
21	4	4	4	4	5	5	4	5	5	4		3	5	4
22	5	4	6	9	5	6	6	5	7	7		10	10	9
23	6	5	4	6	6	6	6	6	8	7		4	10	10
24	2	4	4	4	6	5	4	5	4			6	6	5
25	9	7	5	7	7	6	8	7	9			8	7	9
26	4	6	5	5	5	6	9	6	6	7		9	11	12
27	6	4	6	5	8	5	7	8	7	7		6	4	7
28	3	3	3	2	4	3	3	3	4	3		2	4	4
29	7	8	8	10	8	8	7	6	5	6		5	9	4
30	3	4	4	5	5	4	6	4	4	5		7	5	5
31	8	7	8	11	9	9	11	8	9	10		12	9	13
32	5	5	6	6	7	6	4	6	5	5		9	8	7
33	4	3	3	6	4	4	5	4	6	3		4	5	5
34	7	6	8	8	6	7	8	6	5	7		8	6	6
35	4	7	6	7	9	9	5	5	7	5		6	5	6

Table 23.- Difficult Homogeneous Errors Per Minute by Members of Normal I.Q. Group

Subjects	Minutes										Rest			
	1	2	3	4	5	6	7	8	9	10		1	2	3
1	1	-	-	1	3	-	3	-	2	-	-	-	-	1
2	1	1	-	2	1	2	1	1	3	2	-	1	-	-
3	1	-	2	1	-	-	-	1	-	-	-	-	-	1
4	2	-	-	1	2	-	-	1	1	1	3	2	-	1
5	6	3	1	2	2	4	3	2	1	-	2	1	-	1
6	-	-	-	-	-	-	-	-	-	1	-	-	-	-
7	3	1	1	2	4	1	-	3	4	2	2	1	-	2
8	1	-	2	1	-	2	1	1	1	3	-	1	-	1
9	4	5	1	2	2	4	5	1	2	3	1	-	-	1
10	-	-	1	-	1	-	1	-	-	-	-	-	-	-
11	-	-	-	1	-	-	1	2	-	-	1	-	-	1
12	-	-	-	1	-	2	1	1	-	-	-	-	-	-
13	-	1	1	-	1	-	2	-	-	1	1	-	-	-
14	3	2	3	3	3	2	3	1	-	3	1	-	-	-
15	3	2	3	2	1	-	2	1	1	3	1	1	-	2
16	2	-	1	-	-	-	-	1	-	-	-	1	-	1
17	1	-	-	-	-	1	-	1	-	-	1	-	-	1
18	-	-	-	-	1	1	1	1	1	-	-	-	-	-
19	1	1	2	1	1	1	-	1	-	1	3	1	-	-
20	3	2	-	-	-	-	-	1	-	2	-	-	-	-
21	1	-	-	-	-	1	-	1	-	-	1	-	-	1
22	2	1	-	-	-	1	2	-	1	3	1	1	-	-
23	4	1	-	4	1	2	1	2	5	1	-	4	-	2
24	-	-	-	-	-	-	-	-	-	-	-	2	-	-
25	1	-	1	1	1	-	1	1	1	-	2	-	-	-
26	1	-	-	1	-	-	-	1	3	-	1	-	-	2
27	2	-	-	-	-	1	-	1	2	-	-	1	-	-
28	2	-	3	2	2	-	1	-	1	1	-	1	-	-
29	1	-	1	2	1	1	3	2	2	1	-	1	-	-
30	-	-	1	-	1	2	1	-	-	-	-	2	-	1
31	1	-	-	1	-	-	-	1	1	3	-	-	-	-
32	2	2	3	2	1	3	1	2	2	4	-	1	-	-
33	2	2	1	1	-	-	-	-	1	-	1	-	-	-
34	3	1	1	-	2	-	3	2	2	2	-	-	-	2
35	3	2	4	3	5	5	2	2	4	2	6	2	-	2

Table 24.- Difficult Heterogeneous Problems Per Minute by Members of Normal I.Q. Group

Subjects	Minutes										Rest		
	1	2	3	4	5	6	7	8	9	10	1	2	3
1	4	3	5	7	4	6	7	5	4	5	7	6	6
2	12	17	11	21	17	20	14	19	18		22	23	
3	8	9	9	6	6	7	7	8	5	5	6	6	5
4	3	2	5	6	4	2	4	3	5	5	5	2	5
5	6	8	10	9	12	10	7	11	9	9	7	5	6
6	4	5	4	3	6	5	4	3	3	4	4	4	7
7	7	5	4	6	5	5	6	5	6	6	6	5	7
8	11	8	10	7	10	10	11	9	11	9	11	12	12
9	9	8	10	8	10	9	6	6	5	4	8	9	9
10	3	3	3	3	5	5	1	3	3	3	5	5	5
11	5	5	5	5	8	5	6	6	7	8	2	7	8
12	7	5	7	8	5	5	6	5	6	7	7	5	7
13	4	5	3	4	5	4	5	3	4	4	3	4	4
14	4	5	7	6	6	6	4	6	6	6	5	6	6
15	9	8	8	7	9	7	8	6	6	6	9	6	9
16	7	4	6	5	6	7	7	3	7	5	3	5	2
17	7	6	8	7	5	7	5	7	6	7	5	6	5
18	7	7	5	6	4	5	5	7	6	6	5	2	7
19	6	4	5	7	6	3	4	4	4	3	4	3	4
20	7	5	4	6	4	8	8	6	7	6	7	7	8
21	2	3	2	3	2	1	4	2	3	1	3	3	3
22	1	3	2	2	1	2	5	3	3	4	4	6	4
23	3	4	3	4	3	4	3	4	3	5	2	4	3
24	5	5	3	4	2	3	4	4	6	6	4	6	5
25	4	6	5	5	4	4	4	3	2	1	6	4	3
26	8	5	6	6	6	6	8	4	8	4	5	7	5
27	5	4	3	9	5	4	3	5	4	4	6	5	4
28	5	4	3	5	4	4	3	2	2	4	2	5	4
29	7	7	7	8	7	5	7	5	6	7	6	8	
30	3	3	3	2	3	4	3	4	3	5	3	5	5
31	8	4	5	5	6	4	4	5	3	4	5	5	5
32	5	7	8	7	7	7	7	6	6	6	5	5	5
33	8	4	6	6	7	6	6	7	4	8	5	5	9
34	9	6	4	8	8	8	9	8	5	9	9	9	8
35	10	10	8	7	8	10	9	12	10		11	10	

Table 25.- Errors in Difficult Heterogeneous Problems Per Minute by
Members of the Normal I.Q. Group

Sub- jects	Minutes										Rest	1	2	3
	1	2	3	4	5	6	7	8	9	10				
1	3	-	1	2	1	3	3	3	1	1	1	1	2	1
2	-	-	-	-	1	-	-	-	-	-	1	-	-	-
3	-	-	-	-	-	-	1	1	-	5	-	2	1	-
4	5	1	2	-	1	2	1	-	1	1	-	-	-	-
5	1	4	7	5	4	4	5	4	5	3	4	2	4	-
6	1	3	2	-	-	1	1	-	-	1	-	1	-	-
7	4	3	2	2	2	2	4	1	3	1	2	1	3	-
8	2	2	2	1	4	5	3	6	2	4	7	4	3	-
9	5	4	2	3	4	2	-	3	4	2	4	1	5	-
10	-	-	1	1	1	-	-	-	-	1	-	1	-	-
11	3	2	-	1	2	1	-	2	2	2	-	5	5	-
12	2	-	-	1	-	1	2	3	2	-	3	1	2	-
13	1	1	2	1	-	-	2	1	2	-	1	-	1	-
14	2	3	3	1	1	4	1	3	4	4	2	1	2	-
15	4	3	-	3	3	3	3	2	4	3	2	-	2	-
16	3	2	1	1	3	3	-	3	4	2	-	2	1	-
17	2	-	1	1	1	1	1	1	-	-	2	2	1	-
18	-	-	-	-	1	1	2	2	1	2	1	-	2	-
19	2	-	-	-	-	-	1	2	-	1	2	1	-	-
20	1	2	1	4	4	2	3	1	3	3	2	-	3	-
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	1	2	1	1	-	1	3	2	2	4	2	3	2	-
23	1	-	-	-	-	1	1	-	1	2	1	-	1	-
24	1	1	-	1	-	1	1	2	4	1	1	3	1	-
25	1	1	1	1	-	2	-	1	-	-	1	-	1	-
26	4	1	-	2	4	4	2	2	2	2	2	2	3	-
27	1	2	-	2	1	2	2	-	1	2	3	-	-	-
28	3	2	1	-	4	2	2	1	2	2	1	2	1	-
29	3	1	1	1	3	1	3	1	1	1	1	1	-	-
30	-	-	-	1	-	-	3	-	1	2	-	3	2	-
31	2	2	1	-	1	1	1	4	1	1	1	1	-	-
32	2	3	-	1	4	5	2	3	1	1	2	1	1	-
33	1	2	2	-	2	2	1	3	1	1	1	4	2	-
34	3	5	4	4	5	3	3	6	2	4	6	6	4	-
35	4	3	3	4	5	7	4	7	3	-	7	5	-	-

Table 26.- Normal I.Q. Group Decrement in Homogeneous
Easy Problems

Sub- jects	N/M1	N/M2	Chge.	%Chge.	E/M1	E/M2	%E1	%E2	Chge. %E	%Chge. %E
1	5.00	5.33	.33	6.6	2.00	.67	40.0	12.5	-37.5	-93.7
2	8.00	8.33	.33	4.1	-	1.00	-	12.0	12.0	100.0
3	12.33	19.67	7.33	59.4	.67	.33	5.4	1.6	- 3.8	-70.4
4	8.00	11.50	3.50	43.7	.67	.50	8.3	4.3	- 4.0	-48.1
5	12.00	18.67	6.67	55.6	1.00	3.33	8.3	17.8	9.5	111.4
6	5.33	13.00	7.67	143.9	-	1.00	-	7.6	7.6	100.0
7	7.00	8.00	1.00	14.28	.67	.33	9.5	4.1	- 5.4	-56.8
8	6.00	8.00	2.00	33.3	1.33	1.67	22.1	20.8	- 1.3	- 5.8
9	8.67	15.33	6.67	76.9	2.33	.67	26.8	4.3	-22.5	-83.9
10	12.33	14.67	2.33	18.8	1.00	.33	8.1	2.2	- 5.9	-72.8
11	12.67	20.67	8.00	73.1	1.00	1.00	7.8	4.8	- 3.0	-38.4
12	10.00	11.67	1.67	16.7	.67	1.33	6.7	11.3	4.6	68.6
13	9.00	13.00	4.00	44.4	.33	-	3.6	-	- 3.6	-100.0
14	10.33	15.33	5.00	48.4	2.00	-	19.3	-	-19.3	-100.0
15	10.67	14.33	3.67	34.3	.67	2.00	6.2	13.9	7.7	124.1
16	11.00	18.33	7.33	66.6	-	-	-	-	-	0.0
17	9.00	10.33	1.33	14.7	1.33	1.33	14.7	12.8	- 1.9	- 12.9
18	12.00	13.00	1.00	8.3	.33	.33	2.7	2.5	- .2	- 74.0
19	17.00	22.67	5.67	34.0	.33	1.00	1.9	4.4	2.5	131.5
20	13.33	16.00	2.67	20.0	-	.33	-	2.0	2.0	100.0
21	11.33	18.00	6.67	58.4	1.00	.33	8.8	1.7	- 7.1	- 80.0
22	12.67	18.00	5.33	42.0	-	1.33	-	7.3	7.3	100.0
23	13.00	12.33	-.67	- 5.1	.50	-	3.8	-	-3.8	-100.0
24	11.33	15.00	3.67	32.3	.33	1.00	2.9	6.6	3.7	127.5
25	5.00	10.33	5.33	106.6	-	-	-	-	-	0.0
26	20.33	24.00	3.67	18.0	-	1.00	-	4.1	4.1	100.0
27	10.00	15.67	5.67	36.7	-	-	-	-	-	0.0
28	6.00	8.33	2.33	28.8	-	-	-	-	-	0.0
29	5.67	6.00	.33	5.8	1.67	.33	29.4	5.5	-23.9	- 81.2
30	11.67	14.67	3.00	25.7	-	-	-	-	-	0.0
31	12.00	12.67	.67	5.5	-	-	-	-	-	0.0
32	12.67	16.33	3.67	26.2	-	-	-	-	-	0.0
33	10.00	10.67	.67	6.7	1.67	2.67	16.7	25.0	8.3	49.7
34	7.67	9.00	1.33	17.3	.67	1.67	8.7	18.5	9.2	105.7
35	9.33	12.67	3.33	35.6	1.33	1.00	14.2	7.8	- 6.4	- 45.0

Table 27.- Normal I.Q. Group Decrement in Heterogeneous Easy Problems

Sub- jects	N/M1	N/M2	Chge.	%Chge.	E/M1	E/M2	%E1	%E2	Chge. %E	%Chge. %E
1	8.00	10.00	2.00	25.00	-	.50	-	10.0	10.0	100.0
2	9.00	8.00	-1.00	-11.1	1.00	1.00	11.1	12.5	1.4	12.6
3	6.00	7.00	1.00	16.6	.33	.33	5.5	4.7	-.8	-14.5
4	8.33	9.00	.67	8.0	-	1.00	-	11.1	11.1	100.0
5	3.33	4.33	1.00	30.0	2.67	2.33	80.1	53.8	-26.3	-32.8
6	7.33	10.00	2.67	39.6	.33	-	4.5	-	-4.5	-100.0
7	13.33	12.33	-1.00	-7.5	1.00	-	7.5	-	-7.5	-100.0
8	12.00	13.00	1.00	8.3	-	1.67	-	12.8	12.8	100.0
9	9.67	14.67	5.00	51.7	1.33	.67	13.7	4.5	-9.2	-67.1
10	7.33	10.00	2.67	36.4	.67	1.67	9.1	16.7	7.6	83.5
11	8.00	11.33	3.33	41.6	1.00	.33	12.5	2.9	-9.6	-76.8
12	12.67	15.67	3.00	23.6	1.00	.67	7.8	4.2	-3.6	-46.1
13	9.67	14.00	4.33	44.7	-	.33	-	2.3	2.3	100.0
14	9.00	9.33	.33	3.6	6.33	1.33	70.3	14.2	-56.1	-84.2
15	9.67	11.33	1.33	13.7	1.33	.33	13.7	2.9	-10.8	-78.8
16	8.00	10.67	2.67	33.3	.67	2.00	8.3	18.7	10.4	125.3
17	8.00	11.00	3.00	37.6	.67	.67	8.3	6.0	-2.3	-27.7
18	12.67	18.00	5.33	42.0	-	-	-	-	-	0.0
19	8.67	14.67	6.00	68.2	1.00	2.00	11.5	13.6	2.1	18.2
20	7.33	10.00	2.67	36.4	-	-	-	-	-	0.0
21	11.33	15.67	4.33	38.2	2.00	3.67	17.6	23.4	5.8	32.9
22	19.00	25.00	6.00	31.5	1.33	3.00	7.0	12.0	5.0	71.4
23	6.33	4.33	-2.00	-31.5	6.00	2.67	99.9	61.6	-37.3	-37.3
24	13.00	18.00	5.00	38.4	.50	-	3.8	-	-3.8	-100.0
25	8.33	13.00	4.67	56.0	.67	.33	8.0	2.5	-5.5	-68.7
26	9.67	9.33	-.33	-3.4	-	.67	-	7.1	7.1	100.0
27	10.67	19.00	8.33	78.0	.33	.33	3.0	1.7	-1.3	-43.4
28	6.67	7.00	.33	4.9	-	-	-	-	-	0.0
29	7.33	11.00	3.67	50.0	1.33	1.67	19.3	15.1	-4.2	-21.7
30	10.33	12.00	1.67	16.1	1.33	.67	12.8	5.5	-7.3	-57.0
31	10.33	15.33	5.00	48.4	.33	.33	3.1	2.1	-1.0	-32.2
32	7.00	9.00	2.00	28.5	-	-	-	-	-	0.0
33	10.00	15.33	5.33	53.3	1.33	1.33	13.3	8.6	-4.7	-35.3
34	7.67	12.67	5.00	65.3	1.67	1.67	21.7	13.1	-8.6	-39.6
35	9.33	12.67	3.33	35.6	1.33	1.00	14.2	7.8	-6.4	-45.0

Table 28.- Normal I.Q. Group Decrement in Homogeneous Difficult Problems

Sub-jects	N/M ₁	N/M ₂	Chge.	%Chge.	E/M ₁	E/M ₂	%E ₁	%E ₂	Chge. %E	%Chge. %E
1	6.33	7.67	1.33	21.0	.67	.33	10.5	4.3	- 6.2	- 59.0
2	5.33	4.67	- .67	-12.5	2.00	.33	37.5	7.0	-30.5	- 80.0
3	3.67	3.33	- .33	- 8.9	.33	.33	8.9	9.9	1.0	11.2
4	4.00	5.00	1.00	25.0	1.00	2.33	25.0	46.6	21.6	86.4
5	3.67	4.67	1.00	27.2	1.00	1.33	27.2	28.4	1.2	4.4
6	6.00	9.00	3.00	5.0	.33	-	5.5	-	5.5	-100.0
7	6.67	7.00	.33	4.9	3.00	2.67	44.9	38.1	- 6.8	- 15.1
8	6.00	7.00	1.00	16.6	1.67	.67	27.8	9.5	-18.3	- 65.8
9	8.67	9.67	1.00	11.5	2.00	.67	23.0	6.9	-16.1	- 70.0
10	3.00	4.00	1.00	33.3	-	-	-	-	-	-
11	6.33	10.00	3.67	57.9	.67	.67	10.5	6.7	- 3.8	- 36.1
12	11.00	12.00	1.00	9.0	.33	-	3.0	-	- 3.0	-100.0
13	6.67	9.33	2.67	40.0	.33	.33	4.9	3.5	- 1.4	- 28.5
14	3.67	5.33	1.67	45.5	1.33	.33	36.2	6.1	-30.5	- 84.2
15	4.33	5.00	.67	15.4	1.67	1.33	38.5	26.6	-11.9	- 30.9
16	6.33	10.33	4.00	63.1	.33	.67	5.2	6.4	1.2	23.0
17	7.33	10.33	3.00	43.9	.33	.67	4.5	6.4	1.9	42.2
18	8.67	12.67	4.00	46.1	.67	-	7.7	-	- 7.7	-100.0
19	4.67	7.00	2.33	49.8	.67	1.33	14.3	20.4	6.1	42.6
20	4.67	4.67	-	-	1.00	-	21.4	-	-21.4	-100.0
21	4.67	4.00	- .67	-14.3	.33	.67	7.0	16.7	9.7	138.5
22	6.33	9.67	3.33	52.6	1.33	.67	21.0	6.9	-14.1	- 67.1
23	4.50	5.61	1.11	21.2	-	.67	-	11.8	-11.8	-100.0
24	7.00	8.00	1.00	14.2	2.67	2.00	38.1	25.0	-13.1	- 34.3
25	8.00	10.33	2.33	29.1	1.00	.67	12.5	6.4	- 6.1	- 48.8
26	6.33	9.67	3.33	52.6	1.33	1.00	21.0	10.3	-11.7	- 55.7
27	7.33	5.67	-1.67	-22.7	1.00	.33	13.9	5.8	- 8.1	- 58.2
28	3.33	3.33	-	-	.67	.33	20.1	9.9	-10.2	- 50.7
29	5.67	6.00	.33	5.7	1.67	.33	29.4	3.5	-25.9	-1550.8
30.	4.33	5.67	1.33	30.7	-	1.00	-	17.6	-17.6	-100.0
31	9.00	11.33	2.33	25.8	1.33	-	14.7	-	14.7	-1105.0
32	5.33	7.67	2.33	43.7	2.67	.33	50.0	4.3	-45.7	- 91.4
33	6.00	6.67	.67	11.1	2.00	.67	33.3	10.0	-23.3	- 96.9
34	4.33	4.67	.33	7.6	.33	.33	7.6	7.0	- .6	- 7.8
35	5.67	5.67	-	-	2.67	3.33	47.0	58.7	11.7	24.8

Table 29.- Normal I.Q. Group Decrement in Heterogeneous Difficult Problems

Sub-jects	N/M ₁	N/M ₂	Chge.	%Chge.	E/M ₁	E/M ₂	%E ₁	%E ₂	Chge. %E	%Chge. %E
1	18.50	6.33	1.67	35.7	1.67	1.33	35.7	21.0	-14.7	-41.1
2	4.67	22.50	4.00	21.6	-	.5	-	2.22	2.22	100.0
3	6.00	5.67	-.33	- 5.2	.67	-	11.1	-	-11.1	-100.0
4	4.33	4.00	-.33	- 7.6	2.00	1.00	46.1	25.0	-21.1	- 47.7
5	9.07	6.00	-3.67	-37.9	4.00	3.33	41.3	65.5	24.2	58.5
6	3.33	5.00	1.67	50.1	.33	.33	9.9	6.6	- 2.5	- 25.2
7	5.67	6.00	.33	5.8	1.67	2.00	2.9	3.3	.4	- 23.9
8	9.67	11.67	2.00	20.6	4.00	4.67	41.3	40.0	- 1.3	- 3.1
9	5.00	8.67	3.67	73.4	3.00	3.33	60.0	49.9	-11.1	- 18.5
10	3.00	5.00	2.00	66.6	.33	.33	11.0	6.6	- 4.4	- 40.0
11	7.00	5.67	-1.33	-19.0	2.00	3.33	28.5	58.7	-30.2	-134.0
12	6.00	6.33	.33	5.5	1.67	2.00	27.8	31.6	3.2	105.9
13	3.67	3.67	-	-	1.00	.67	27.2	18.2	- 7.0	-25.7
14	6.00	5.67	-.33	- 5.2	3.67	1.67	61.1	29.4	-31.7	- 51.8
15	6.00	8.00	2.00	33.3	3.00	1.33	50.0	16.6	-33.4	- 66.8
16	5.00	3.33	-1.67	-33.4	3.00	1.00	60.0	30.0	-30.0	- 50.0
17	6.67	5.33	-1.33	-20.0	.33	1.67	4.9	31.3	26.4	538.7
18	6.33	4.67	-1.67	-26.3	1.67	1.00	26.3	21.4	- 4.9	- 18.6
19	3.67	3.67	-	-	1.00	1.00	27.2	27.2	0.0	-
20	6.33	7.33	1.00	15.7	2.33	1.67	36.8	22.9	-13.9	- 37.7
21	2.00	3.00	1.00	50.0	-	-	-	-	-	-
22	3.33	4.67	1.33	39.9	2.67	2.33	80.1	49.8	-30.3	- 37.8
23	4.00	3.00	-1.00	-25.0	1.00	.67	25.0	22.3	- 2.7	- 10.8
24	5.33	5.00	-.33	- 6.1	2.33	1.33	43.7	26.6	-17.1	- 39.1
25	2.00	3.33	1.33	66.5	.33	.67	16.5	18.2	1.7	10.3
26	5.33	5.67	.33	6.1	2.00	2.33	37.5	41.0	3.5	9.3
27	4.33	5.00	.67	15.4	1.00	1.00	23.0	20.0	- 3.0	- 13.0
28	2.67	3.67	1.00	37.4	1.67	1.33	62.5	36.2	-26.3	- 42.0
29	6.00	7.00	1.00	16.6	1.00	1.00	16.6	14.2	- 1.6	- 9.6
30	4.00	4.33	.33	8.2	1.00	1.67	25.0	38.5	13.5	54.0
31	4.00	5.00	1.00	25.0	2.00	.67	50.0	13.4	-46.6	- 93.3
32	6.00	5.00	-1.00	-16.6	1.33	1.33	22.1	26.6	4.5	20.3
33	5.33	6.33	1.00	18.7	1.67	2.33	31.3	36.8	15.5	49.5
34	7.33	8.67	1.33	18.2	4.00	5.33	57.7	61.4	3.7	6.4
35	11.00	10.50	-.50	- 4.3	5.00	6.00	45.4	57.1	11.7	25.7