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# A Study of the Self-Analysis Method as used in Improving the Study Habits of the Student of Intermediate Psychology at the Municipal University of Omaha

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THESIS

# A STUDY OF THE SELF-ANALYSIS METHOD AS USED IN IMPROVING THE STUDY HABITS OF THE STUDENT OF INTERMEDIATE PSYCHOLOGY AT THE MUNICIPAL UNIVERSITY OF OMAHA

by

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# CHAPTER I

## The Problem and Its Scope

### Statement of the Problem

This study is based upon the idea that a student can make a self-analysis of his study habits and use available tools to correct existing faults. For this purpose, the writer compiled the "Study Aid Pamphlet." (See Appendix, Table I). This pamphlet was composed of a list of tested study procedures and included Ruch's[1] "Study Habit Inventory" questions. This concept is tested on two numerically equal groups of students in Intermediate Psychology. These groups are paired on the basis of the Ohio College Association Test[2] and are designated as the Experimental Group and the Control Group.

In the Intermediate Psychology class, both the experimental and control groups covered the same material, used the same textbooks and took the same examinations. The only known difference being that the experimental group was given the "Study Aid Pamphlet", while the control group did not receive any formal study aid. This study attempts to answer the following question: <u>To what extent does the Study Aid Pamphlet affect the comparative grades of the two groups, and which particular type of student would benefit most from the Study Aid Pamphlet; those with high Ohio College Association test scores[3] or those with low Ohio College Association test scores.</u>

The purposes of this research problem are:

1. To determine whether or not the "Study Aid Pamphlet increases

the quality of performance of the student.

2. To determine whether or not the student's opinion of his degree of use of the pamphlet correlates with the actual benefit he achieved from the pamphlet.

3. To determine which type of student, as determined on the basis of Ohio College Association[4] test scores, Study Habits Inventory[5] test score, and Psychology test score standings, gains the most from the "Study Aid Pamphlet."

Setting the Limits of the Study.

This study is limited to 154 students of Intermediate Psychology at the University of Omaha; Omaha Nebraska. Excluded from the study are all pupils whose absence was greater than three class periods of the thirty-six class periods required to complete this study. While this eliminates a number of students from the study, it very nearly equalizes the absence between the groups. Also excluded from the study are those students whose Ohio College Association test scores could not be paired to make two numerically equal groups. Thus, of 197 students in the class, only 154 are included.

Limitations of the Study.

One of the limitations of this study is that the students in the experimental group were given the "Study Aid Pamphlet" and were to make a self-analysis of their study habits. They then were to make corrections of any faulty habits. The only condition governing their use of the "Study Aid Pamphlet", was

that after the final psychology test, they rated themselves on the completeness of use of the above aid.

Another factor that influenced later analysis was the variation in difficulty of the first and second test.

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# CHAPTER II

## Review of Related Research

The purpose of this chapter is to cite illustrations of related research that appear to be connected with this study. This chapter is divided into two parts. The first part treats factors important in the Study situation, budgeting of time, planning and study conditions. Part two deals with reading for meaning, the employment of memory aids and vocabulary building.

### Factors Important in the Study Situation, Budgeting of Time, Planning, and Study Conditions.

One of the chief elements of the study problem is time. Hamrick[1] states that the average college student wastes thirty-one and one-half hours a week. Developing habits of efficient time use is a somewhat different proposition than many students believe it to be. Robinson[2] states that a person is efficient not because of any super human display of concentration, but rather because he has developed habitual patterns or sequences of activities. Bird and Bird[3] note that before study activities can be planned successfully, before you decide on how you ought to apportion your time, it is essential to know how you do spend your time.

These observations carry the full import of time as an essential element to success in study. The time factor then appears to be of paramount importance in any study situation.

Headly[4] observes that of those who have a right to be in college, none is so unfortunate that he will not be rewarded by wise expenditure of time and none is so gifted that he can afford to squander this one asset. Student recklessness in the expenditure of time is due, at least in part, to lack of parental or teacher supervision. Rigg[5] believes that many college freshman are, for the first time in their lives, thrown upon their own responsibility in the matter of time. In high or preparatory school, they were told to do certain things at certain hours. Perhaps their parents saw to it that they studied with some regularity, and exercised a sort of veto power over evening engagements. But, in college they are gloriously free. There is nobody to remind them to study that lesson for tomorrow or to tell them not to go to the movies.

According to Robinson[6] school programs are so planned that every student should be able to have a suitable balance between study, recreation, eating and sleeping. When a student feels too hurried, he will probably find that rearranging his use of time--his whole time--will help. Headley[7] points out that to investigate our investment of time, we like the accountant, must know what funds we have. From this data, we must make accurate credits and debits.[8] Woodrow Wilson once remarked that on many campuses the sideshows were about to swallow up the circus, be that as it may, extracurricular activities are a necessary part of the normal collegiate life. However, a scheduled, planned program permits the student to participate with

an economy of time, both in the side show and the main event.

In addition to the factor of time, it is necessary to plan the study conditions, plan your notebook, in other words, look ahead. Hamrick[9] notes that keeping special assignment sheets in your notebook for each course is a step in the proper direction. Bird and Bird[10] state that the forming of the habit of planning a specific time for study, trying to start planning or organizing several hours a day before the actual studying is to take place, and determining the purpose and goals of your work before you begin as being prime factors aiding the good student. Of a group of Command and General Staff College[11] students picked for their good study habits, half listed "planning their study and organizing their material and assignments prior to study" as a helpful technique. Not one of a group picked for poor study habits listed this technique.

According to Frederick[12] evidence has proved that a definite and quiet place for concentration is conducive to progress in study. Control of the study environment with an eye for lessening distracting influences is according to Pressey[13] another of the main factors for success in school work. In the 1946-47 class at the Command and General Staff College,[14] poor study groups mentioned noise and distraction as interferring with study much more frequently than did the good study groups. This suggests that those with poor study habits are readily distracted. Robinson[15] observes that the individual who has learned to concentrate in spite of extraneous noise will, if that distraction is great, be near exhaustion at the end of three hours of

study. The student who cannot shut out distraction will spend many exhausting hours, where a few efficient ones would do.

Reading for Meaning, the Employment of Memory Aids and Vocabulary Building.

Reading must be an active process. Learning and interest depend on the mental alertness of the student.[16] Frederick offers the advice that it is necessary to decide before you start why you are reading. Then you will know what to look for in your text. The main purpose of reading is to understand, that is, to comprehend clearly and adequately. According to Bird and Bird[17] a survey of the general topic creates further interest and will assist in the maintenance of continuity. From the above data, one gathers that reading is the cornerstone on which the foundation of learning is built.[18] Eurich notes that reading ability is something which can be acquired through hard work and elimination of inefficient habits.

The use of memory aids form another link in the ever growing chain necessary to forge good study techniques.[19] Frederick states that there is no substitute for understanding by brute force, by constant repetition, nonsense can be learned. It can be memorized, but the effort is out of all proportion to its value. In the crowded College program of the college student, brute memorizing soon breaks down, and the student goes home bewildered and bedeviled. English, in a study of rote facts compared with memory of essential thought after different time intervals states that in such a short period of time as

twenty-four hours over twenty-five per cent of rote material was forgotten.[21] According to Frederick, the best technique for developing a good memory is to overlearn the material. This, he implies requires that the material be clear and vivid in the mind of the learner. The best means of accomplishing according to all the above information, is to represent the idea graphically, related it to your experience, interrogate yourself and above all obtain a clear understanding of the problem.

Clear understanding can only be obtained by getting the proper concepts in reading. Language, spoken and written and reading, the perusal of written matter are of vital importance to the college student.[22] Wrightstone states that to read understandingly, we need to know the meaning of all the words in a passage.[23] New words, according to Welsey upon their initial appearance seem to be only arbitrary names to the student who encounters them for the first time. However, in this connection, Welsey[24] points out that verbalization of these arbitrary names constitutes the first step in acquiring the understanding of a new word. It is impossible to read without paying attention to vocabulary according to Frederick.[25] A rich vocabulary is commonly recognized as an ear mark of success in college and also in life.

Summary of the Chapter.

The information cited in this chapter has revolved around these points:

1. Budgeting time is elemental in acquiring good study techniques.
2. Organization of material and choice of study conditions are of prime importance in study situations.
3. Reading for meaning, improvements of vocabulary and sensible use of memory aids are keynotes for success in college.

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# CHAPTER III

## Plan of the Study

The textbook employed by the Intermediate Psychology class at the University of Omaha was Norman L. Munn's,[1] "The Fundamentals of Human Adjustment." The questions on the first and final psychology tests used in this study were obtained from Norman L. Munn's[2] "Instructor's Manual Form B." This manual was written specifically for use with the text used by the Intermediate Psychology class. The reliability of the two tests was determined by using the split halves correlation technique.[3] According to Stroud,[4] a valid psychology test measures knowledge of psychology. In the construction of the tests used in this study, there were two guiding principles; first, the items selected were those which the students for whom the test was designed had an opportunity to learn; second, as was mentioned above the test items were selected from the "Instructors Manual, Form B" prepared by Norman L. Munn.[5] A reliability correlation coefficient of .978 was obtained on the first psychology test and .965 on the final psychology test. These correlation coefficients indicated a high degree of reliability.

The "Study Aid Pamphlet" was composed of a list of tested study techniques and procedures, and included Ruch's[6] "Study Habits Inventory questions. (See Appendix, Table I).

The next step was the selection of the subjects for this study. The Intermediate Psychology class, consisting of 197

hetrogeneously grouped students were taught by two instructors. These students met in two lecture classes weekly and one discussion class weekly. The class was then ranged from 95th percentile to 3rd percentile on the basis of the Ohio College Association test.[7] They were then equally separated into experimental and control groups. (See Table I).

On March 17, 1949, both groups (experimental and control) took the first psychology test. On March 24, 1949, the experimental group was brought together and was given the "Study Aid Pamphlet" with the following instructions:

"The reasons for talking to you this morning are many. First of all, you have been given a prominent place in a research problem that may help many college students. You are being given the first large opportunity to test this process to determine if it will work. Your contribution by participating in this test will not only benefit future students, but also will be of aid to you and your fellow classmates.

When you get the Study Aid Pamphlet allow yourself ample time to accomplish all that it will instruct you to do. Please do not read it now, wait until you are alone and free of distractions. There are directions included in each one. Remember, you can help yourself----if you will do everything you are supposed to do.

There are some instructions not included in the pamphlet that you must know. First, you are an experimental group. On you depends the outcome of this study. Please do not show this

pamphlet to anyone else, or talk about it publicly or privately with anyone. This is vitally important. Your friends and classmates will be able to avail themselves of any benefits realized from this study after second quarter examinations. Your complete cooperation will make this study valuable. Remember, in order to make this a valid, reliable experiment, will you please be sure not to communicate with anyone in any way concerning your part in this study until after second quarter examinations.

I want to extend my fullest thanks to all of you for your interest, generousity and cooperation. I appreciate all you are going to do in making this study a success."

During the period from March 24, 1949 to April 28, 1949 the experimental group used the "Study Aid Pamphlet. They were not given any other form of study help.

On April 28, 1949, both the experimental and control groups were given the final psychology examination.

The experimental group was then asked to rate themselves (See Appendix, Table 3) on the use of the "Study Aid Pamphlet". The rating was on a five point scale:

| Little | Some | Average | Much | Completely |
|---|---|---|---|---|
| 0 | 25 | 50 | 75 | 100 |

At the end of the examinations the tests were graded and the results made known to the students. The tabulation of the paired Ohio College Association test scores and the first psychology test and final psychology test scores are found in Table I. For purposes of convenience the Ohio College Association

test will be termed the O.C.A. for the rest of the study. Also tabulated in Table I are the scores of Wrenn's[9], "Study Habits Inventory" for the experimental and control groups.

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TABLE I: Tabulation of: O.C.A. Scores; 1st Psychology Test Scores; Final Psychology Test Scores; Study Habit Inventory Scores of the Experimental Group. Also Tabulated are Student Ratings on the use of Study Habit Pamphlet, Done by Experimental Group.

EXPERIMENTAL GROUP

| No. | OCA Score | Study Habits Inventory | 1st Psych. Test | Final Psych. Test | Rating on the use of Pamphlet |
|---|---|---|---|---|---|
| 1. | 95 | 79 | 60 | 64 | 25 |
| 2. | 94 | 62 | 59 | 61 | 50 |
| 3. | 93 | 34 | 62 | 68 | 50 |
| 4. | 92 | 35 | 52 | 54 | 25 |
| 5. | 88 | 62 | 59 | 68 | 75 |
| 6. | 86 | 17 | 62 | 62 | 0 |
| 7. | 85 | 71 | 57 | 56 | 25 |
| 8. | 85 | 36 | 56 | 54 | 25 |
| 9. | 81 | 92 | 51 | 56 | 75 |
| 10. | 81 | 81 | 60 | 65 | 50 |
| 11. | 80 | 46 | 63 | 67 | 50 |
| 12. | 78 | 71 | 52 | 54 | 50 |
| 13. | 77 | -11 | 56 | 56 | 0 |
| 14. | 76 | 40 | 60 | 66 | 25 |
| 15. | 76 | -4 | 55 | 50 | 25 |
| 16. | 75 | 34 | 59 | 64 | 75 |
| 17. | 75 | -3 | 50 | 56 | 0 |
| 18. | 74 | 53 | 55 | 59 | 75 |
| 19. | 72 | 79 | 51 | 52 | 50 |
| 20. | 71 | -26 | 62 | 57 | 0 |
| 21. | 71 | 99 | 62 | 53 | 25 |
| 22. | 70 | 65 | 56 | 58 | 50 |
| 23. | 70 | 31 | 54 | 58 | 50 |
| 24. | 69 | 18 | 57 | 62 | 75 |
| 25. | 68 | -15 | 48 | 54 | 25 |
| 26. | 68 | 53 | 56 | 50 | 25 |
| 27. | 65 | 45 | 61 | 68 | 75 |
| 28. | 63 | 33 | 57 | 47 | 25 |
| 29. | 63 | 22 | 49 | 48 | 50 |
| 30. | 63 | 22 | 58 | 63 | 25 |
| 31. | 63 | 80 | 55 | 57 | 50 |
| 32. | 62 | 13 | 56 | 59 | 50 |
| 33. | 61 | 7 | 60 | 63 | 0 |
| 34. | 61 | -6 | 53 | 53 | 25 |
| 35. | 59 | 14 | 43 | 52 | 55 |
| 36. | 59 | 6 | 61 | 58 | 35 |
| 37. | 58 | 67 | 48 | 57 | 75 |

TABLE I: Cont. Experimental Group

| No. | OCA Score | Study Habits Inventory | 1st Psych. Test | Final Psych. Test | Rating on the use of Pamphlet |
|---|---|---|---|---|---|
| 38. | 57 | 133 | 51 | 55 | 50 |
| 39. | 56 | 99 | 53 | 50 | 50 |
| 40. | 55 | 110 | 55 | 49 | 25 |
| 41. | 54 | -54 | 50 | 52 | 50 |
| 42. | 54 | 0 | 52 | 47 | 25 |
| 43. | 53 | 20 | 56 | 55 | 50 |
| 44. | 52 | 17 | 56 | 58 | 25 |
| 45. | 51 | 1 | 48 | 52 | 25 |
| 46. | 50 | 4 | 57 | 65 | 50 |
| 47. | 49 | -6 | 61 | 49 | 25 |
| 48. | 45 | -4 | 48 | 40 | 0 |
| 49. | 45 | 55 | 46 | 55 | 50 |
| 50. | 44 | -6 | 55 | 52 | 50 |
| 51. | 44 | 17 | 57 | 61 | 25 |
| 52. | 43 | 96 | 55 | 57 | 50 |
| 53. | 43 | 21 | 43 | 45 | 50 |
| 54. | 41 | 7 | 44 | 49 | 50 |
| 55. | 36 | -52 | 53 | 44 | 0 |
| 56. | 36 | 105 | 55 | 53 | 50 |
| 57. | 36 | 44 | 57 | 48 | 50 |
| 58. | 34 | 2 | 46 | 54 | 75 |
| 59. | 32 | -37 | 52 | 55 | 75 |
| 60. | 31 | 24 | 53 | 56 | 50 |
| 61. | 28 | 91 | 58 | 46 | 50 |
| 62. | 27 | 44 | 55 | 56 | 50 |
| 63. | 27 | 16 | 49 | 51 | 50 |
| 64. | 26 | 14 | 61 | 58 | 50 |
| 65. | 25 | 9 | 48 | 58 | 25 |
| 66. | 24 | 25 | 53 | 47 | 50 |
| 67. | 23 | 123 | 42 | 61 | 50 |
| 68. | 22 | -92 | 53 | 58 | 75 |
| 69. | 21 | 28 | 55 | 56 | 50 |
| 70. | 16 | 59 | 51 | 50 | 50 |
| 71. | 15 | 46 | 52 | 46 | 50 |
| 72. | 14 | -10 | 49 | 57 | 75 |
| 73. | 14 | 83 | 47 | 49 | 50 |
| 74. | 13 | 50 | 52 | 47 | 50 |
| 75. | 11 | -17 | 47 | 46 | 50 |
| 76. | 11 | -52 | 49 | 52 | 50 |
| 77. | 3 | 38 | 48 | 49 | 25 |

TABLE I: Tabulation of: O.C.A. Scores; 1st Psychology Test Scores; Final Psychology Test Scores; Study Habit Inventory Scores of the Control Group.

CONTROL GROUP

| No. | OCA Score | Study Habits Inventory | 1st Psych. Test | Final Psych. Test |
|---|---|---|---|---|
| 1. | 95 | -3 | 63 | 63 |
| 2. | 93 | 37 | 60 | 56 |
| 3. | 93 | 37 | 57 | 60 |
| 4. | 89 | 31 | 61 | 56 |
| 5. | 86 | 29 | 60 | 58 |
| 6. | 86 | 33 | 65 | 64 |
| 7. | 85 | 30 | 48 | 53 |
| 8. | 83 | 141 | 56 | 57 |
| 9. | 81 | 57 | 56 | 60 |
| 10. | 81 | 64 | 59 | 65 |
| 11. | 79 | 109 | 51 | 59 |
| 12. | 77 | 10 | 58 | 64 |
| 13. | 77 | 43 | 61 | 58 |
| 14. | 76 | 62 | 52 | 56 |
| 15. | 76 | 60 | 57 | 51 |
| 16. | 75 | -64 | 61 | 56 |
| 17. | 75 | 4 | 63 | 58 |
| 18. | 74 | -3 | 60 | 59 |
| 19. | 72 | 18 | 54 | 57 |
| 20. | 71 | 60 | 56 | 55 |
| 21. | 70 | 61 | 52 | 57 |
| 22. | 70 | 36 | 45 | 43 |
| 23. | 70 | 45 | 49 | 51 |
| 24. | 68 | -33 | 52 | 55 |
| 25. | 68 | 47 | 57 | 62 |
| 26. | 66 | 130 | 61 | 52 |
| 27. | 65 | 67 | 48 | 56 |
| 28. | 63 | -19 | 58 | 50 |
| 29. | 63 | 9 | 57 | 52 |
| 30. | 63 | 14 | 53 | 54 |
| 31. | 63 | 49 | 47 | 47 |
| 32. | 61 | 16 | 56 | 58 |
| 33. | 61 | -7 | 66 | 62 |
| 34. | 60 | -48 | 45 | 49 |
| 35. | 59 | 20 | 48 | 49 |
| 36. | 59 | 8 | 59 | 51 |
| 37. | 58 | 90 | 55 | 53 |
| 38. | 57 | 32 | 56 | 55 |
| 39. | 55 | 0 | 48 | 50 |
| 40. | 54 | -16 | 50 | 40 |

TABLE I: Cont. Control Group

| No. | OCA Score | Study Habits Inventory | 1st Psych. Test | Final Psych. Test |
|---|---|---|---|---|
| 41. | 54 | -72 | 58 | 54 |
| 42. | 53 | 75 | 54 | 55 |
| 43. | 52 | 89 | 59 | 57 |
| 44. | 51 | -2 | 48 | 54 |
| 45. | 51 | 93 | 52 | 51 |
| 46. | 50 | 46 | 54 | 55 |
| 47. | 49 | 88 | 45 | 53 |
| 48. | 45 | -11 | 61 | 46 |
| 49. | 45 | 75 | 50 | 55 |
| 50. | 44 | 54 | 56 | 61 |
| 51. | 43 | 27 | 47 | 48 |
| 52. | 43 | 43 | 44 | 58 |
| 53. | 42 | 52 | 63 | 52 |
| 54. | 40 | 1 | 53 | 60 |
| 55. | 36 | 69 | 57 | 52 |
| 56. | 36 | 49 | 48 | 36 |
| 57. | 35 | -10 | 50 | 52 |
| 58. | 34 | -45 | 47 | 48 |
| 59. | 32 | -3 | 56 | 48 |
| 60. | 31 | 101 | 51 | 43 |
| 61. | 28 | -17 | 48 | 48 |
| 62. | 28 | 127 | 54 | 50 |
| 63. | 27 | 4 | 51 | 51 |
| 64. | 25 | -34 | 47 | 42 |
| 65. | 24 | 5 | 58 | 54 |
| 66. | 24 | 33 | 53 | 55 |
| 67. | 24 | 56 | 48 | 49 |
| 68. | 21 | 51 | 55 | 46 |
| 69. | 21 | -6 | 39 | 44 |
| 70. | 17 | 50 | 44 | 45 |
| 71. | 16 | 70 | 52 | 40 |
| 72. | 15 | -5 | 56 | 49 |
| 73. | 14 | 65 | 65 | 51 |
| 74. | 12 | -10 | 48 | 42 |
| 75. | 12 | 30 | 50 | 53 |
| 76. | 11 | 17 | 39 | 49 |
| 77. | 5 | -15 | 55 | 46 |

# CHAPTER IV

## The Experiment and Interpretation of Results

### PART I

### Statistical Procedures Used in this Study

The statistical procedures employed in this part of the study are those of Snedecor's[1] Large Sample Methods. The two-way class frequency distribution technique is employed in calculating the coefficients of correlation, the means, and the standard deviations.

### Explanation of Formulae and Symbols

a. For computing the correlation coefficient:

$$r = \frac{Sxy}{\sqrt{(Sx^2)\,(Sy^2)}}$$

Code X = Deviations of the class marks from the assumed mean.

Code Y = Deviations of the class marks from the assumed mean.

Sxy = The sum of the products of the deviations of each measure from the central tendency of the X and Y axes.

Sx = $\overset{\text{Sum of}}{\wedge}$ deviation of X from the mean.

Sy = $\overset{\text{Sum of}}{\wedge}$ deviation of Y from the mean.

r = The coefficient of correlation.

b. For computing the significance of the difference between two correlation coefficients:

$$t = \frac{z_c - z_e}{\sqrt{\frac{1}{n-3} + \frac{1}{n-3}}}$$

$t$ = The measurement of significance.

$z$ = The quantity devised by Fisher,[2] arrived at by Figure 7.4 of Snedecor.[3]

$n$ = The number of observations in each group.

c. For computing the mean:

$\overline{x}$ = The mean.

$\overline{x} = G + I(SfX) / n$

$G$ = The assumed mean.

$SfX$ = The sum of the frequency times X.

$n$ = The number of observations in each group.

$I$ = The class interval.

d. For computing the variance.

$s^2$ = The variance

$Sx^2 = SfX^2 - ( (Sfx)^2 / n)$

$(SfX)^2$ = The sum of the frequency times the code, then squared.

$SfX^2$ = The sum of the frequency times the square of the code.

$s^2 = I^2 (Sx^2) / n-1$

e. For computing the standard deviation:

$s$ = The standard deviation

$s = \sqrt{s^2}$

f. For computing the standard error:

$s_{\overline{x}}$ = The standard error of the mean

$s_{\overline{x}} = \sqrt{s^2 / n}$ or $s_{\overline{x}} = s / \sqrt{n}$

In this study, the first formula is used for computing the standard error.

g. For computing the significance of the difference between the means:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_{\bar{x}_1 - \bar{x}_2}}$$

$$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{s_{\bar{x}_1}^2 + s_{\bar{x}_2}^2 - 2r\, s_{\bar{x}_1}\, s_{\bar{x}_2}}$$

$s_{\bar{x}_1}$ = The standard error of one group.

$s_{\bar{x}_2}$ = The standard error of the other group.

$r$ = The coefficient of correlation computed from the test scores of experimental and control groups.

$s_{\bar{x}_1 - \bar{x}_2}$ = The standard deviation of the difference of the means of the two groups.

PART II

The statistical procedures employed in this part of the study are Snedecor's[4] Comparison of Individuals.

Explanation of Formulae and Symbols

a. For computing the mean.

$\bar{x}$ = The difference between means

$\bar{x} = (SX) / n$

b. For computing the variance.

$s^2$ = The variance.

$s^2 = S x^2 / n - 1$

c. For computing the standard error.

$s_{\bar{x}}$ = The standard error of the mean

$$s_{\bar{x}} = \sqrt{s_2 / n}$$

d. For computing the significance of difference between means.

$$t = \bar{x} / s_{\bar{x}}$$

f. <u>For comparision of two groups of equal size, Snedecor.</u> [5]

$$s_{\bar{x}_1} - \bar{x}_2 = \sqrt{2 s^2 / n}$$

g. For comparison of two groups of different sizes, Snedecor.6

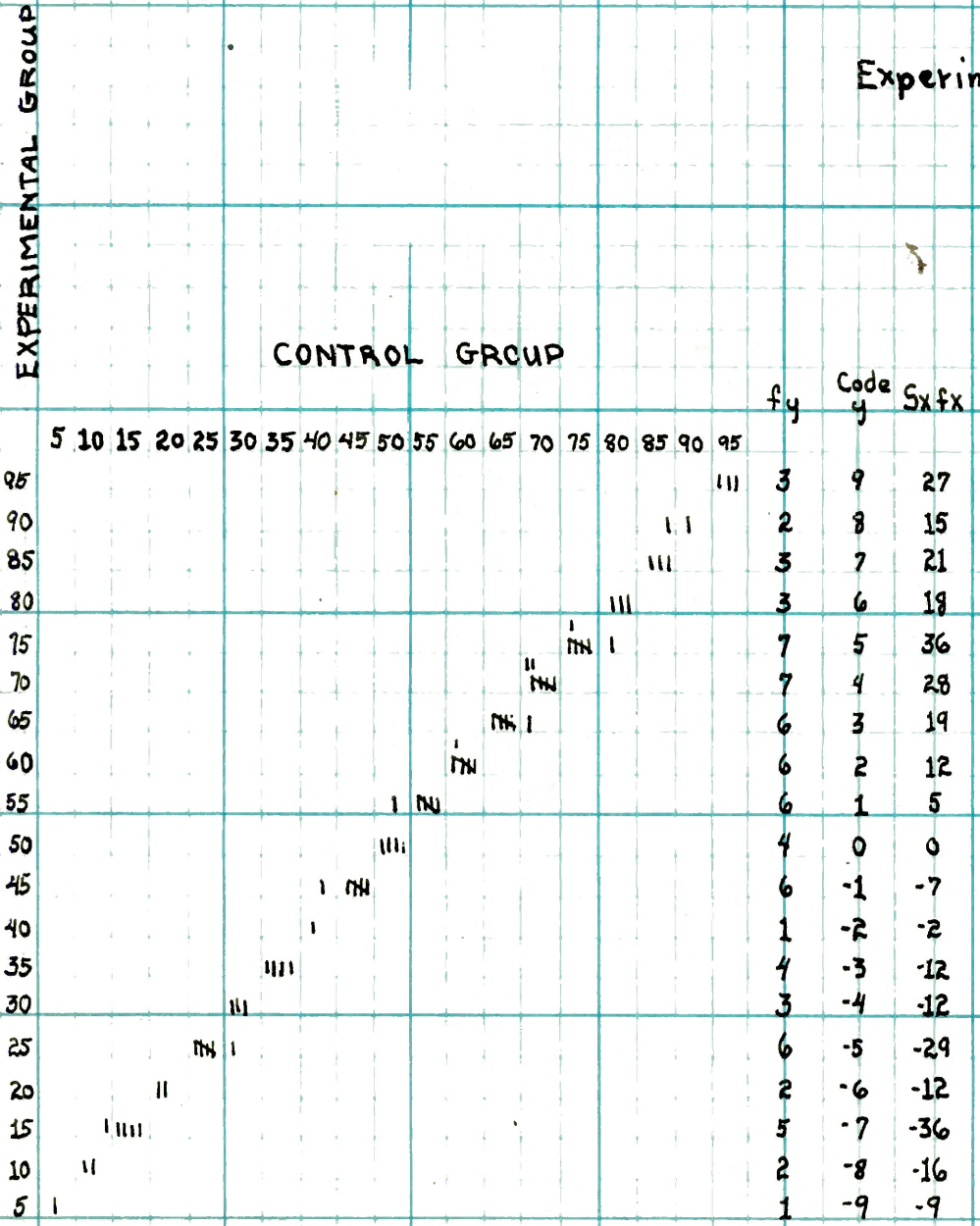
$s^2$ = The variance

$s^2$ = Sum of $Sx^2$ / Sum of Degrees of Freedom.

$$s_{\bar{x}_1} - \bar{x}_2 = \sqrt{s^2 (n_1 + n_2) / (n_1)(n_2)}$$

# FIGURE I

Scattergram of O.C.A. scores of Experimental and control groups




| | fy | Code y | Sx fx |
|---|---|---|---|
| 95 | 3 | 9 | 27 |
| 90 | 2 | 8 | 15 |
| 85 | 3 | 7 | 21 |
| 80 | 3 | 6 | 18 |
| 75 | 7 | 5 | 36 |
| 70 | 7 | 4 | 28 |
| 65 | 6 | 3 | 19 |
| 60 | 6 | 2 | 12 |
| 55 | 6 | 1 | 5 |
| 50 | 4 | 0 | 0 |
| 45 | 6 | -1 | -7 |
| 40 | 1 | -2 | -2 |
| 35 | 4 | -3 | -12 |
| 30 | 3 | -4 | -12 |
| 25 | 6 | -5 | -29 |
| 20 | 2 | -6 | -12 |
| 15 | 5 | -7 | -36 |
| 10 | 2 | -8 | -16 |
| 5 | 1 | -9 | -9 |

TABLE II: Computation of Correlation Coefficient of O.C.A. Scores of Experimental and Control Groups.

| $f_x$ | Code X | $SXf_x$ | $SX^2f_x$ | $f_y$ | Code Y | $SXf_x$ | $Y(SXf_x)$ | $SY^2f_y$ | $SYf_y$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -9 | -9 | 81 | 3 | 9 | 27 | 243 | 243 | 27 |
| 3 | -8 | -24 | 192 | 2 | 8 | 15 | 120 | 128 | 16 |
| 4 | -7 | -28 | 196 | 3 | 7 | 21 | 147 | 147 | 21 |
| 2 | -6 | -12 | -72 | 3 | 6 | 18 | 108 | 108 | 18 |
| 5 | -5 | -25 | 125 | 7 | 5 | 36 | 180 | 175 | 35 |
| 4 | -4 | -16 | 64 | 7 | 4 | 28 | 112 | 112 | 28 |
| 4 | -3 | -12 | 36 | 6 | 3 | 19 | 57 | 54 | 18 |
| 2 | -2 | -4 | 8 | 6 | 2 | 12 | 24 | 24 | 12 |
| 5 | -1 | -5 | 5 | 6 | 1 | 5 | 5 | 6 | 6 |
| 5 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| 5 | 1 | 5 | 5 | 6 | -1 | -7 | 7 | 6 | -6 |
| 6 | 2 | 12 | 24 | 1 | -2 | -2 | 4 | 4 | -2 |
| 5 | 3 | 15 | 45 | 4 | -3 | -12 | 36 | 36 | -12 |
| 8 | 4 | 32 | 128 | 3 | -4 | -12 | 48 | 48 | -12 |
| 6 | 5 | 30 | 150 | 6 | -5 | -29 | 145 | 150 | -30 |
| 4 | 6 | 24 | 144 | 2 | -6 | -12 | 72 | 72 | -12 |
| 4 | 7 | 28 | 196 | 5 | -7 | -36 | 252 | 245 | -35 |
| 1 | 8 | 8 | 64 | 2 | -8 | -16 | 128 | 128 | -16 |
| 3 | 9 | 27 | 243 | 1 | -9 | -9 | 81 | 81 | -9 |
| 77 | | ∕46 | 1778 | 77 | | ∕46 | 1769 | 1767 | ∕47 |

$SXf_x = 46$ $\qquad$ $SYf_y = 47$

$SX^2f_x = 1778$ $\qquad$ $SY^2fy = 1767$

$(SXf_x)^{2}/n = \frac{2116}{77} = 27.34$ $\qquad$ $(SYfy)^{2}/n = \frac{2209}{77} = 28.69$

$$S_x^2 = 1778 - 27.34 = 1750.66$$

$$S_y^2 = 1767 - 28.69 = 1738.31$$

$$SXY = 1769$$

$$(SXf_x)(SYf_y) / n = (46)(47) / 77 = \frac{2162}{77} = 28.08$$

$$S_{xy} = 1769 - 28.08 = 1740.92$$

$$r = \frac{S_{xy}}{\sqrt{(S_x^2)\, S_y^2)}} = \frac{1740.92}{\sqrt{(1750.66)\,(1738.31)}} = \frac{1740.92}{1744.50} = .999$$

From the evidence contained in Table II, a highly significant

relationship is shown between the paired Ohio College Association scores of experimental and control groups. It must be pointed out that these scores were deliberately matched for the purposes of this study.

# FIGURE II

Scattergram of O.C.A scores and Ist Psychology test scores of experimental group.

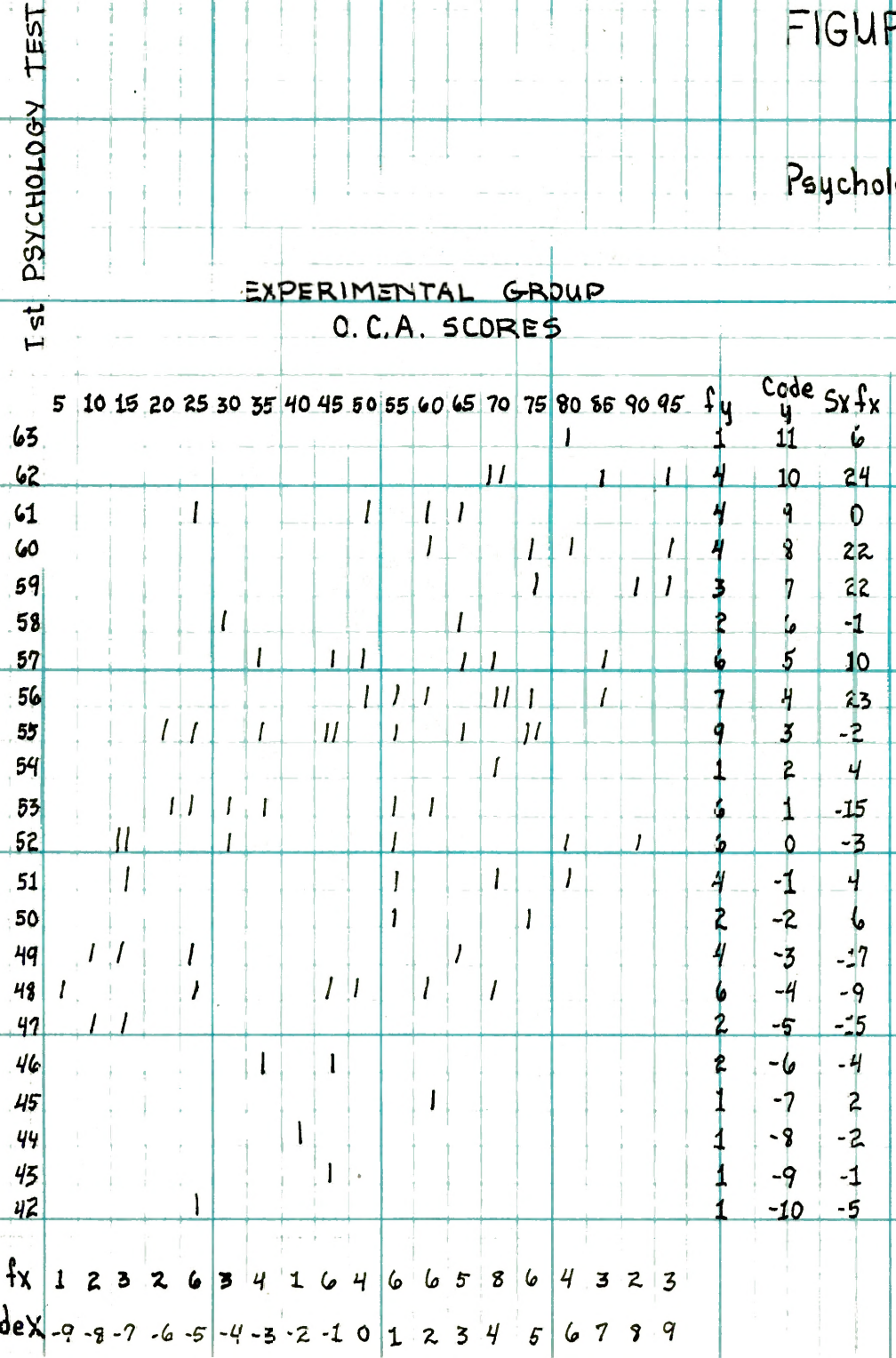


TABLE III: Computation of the Correlation Coefficient of O.C.A. Scores and First Psychology Test Scores of Experimental Group.

| $f_x$ | Code X | $SXf_x$ | $SX^2f_x$ | $f_y$ | Code Y | $SXf_x$ | $Y(SXf_x)$ | $SY^2f_y$ | $SYf_y$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -9 | -9 | 81 | 1 | 11 | 6 | 66 | 121 | 11 |
| 2 | -8 | -16 | 128 | 4 | 10 | 24 | 240 | 400 | 40 |
| 5 | -7 | -35 | 245 | 4 | 9 | 0 | 0 | 324 | 36 |
| 2 | -6 | -12 | 72 | 4 | 8 | 22 | 176 | 256 | 32 |
| 6 | -5 | -30 | 150 | 3 | 7 | 22 | 154 | 147 | 21 |
| 3 | -4 | -12 | 48 | 2 | 6 | -1 | -6 | 72 | 12 |
| 4 | -3 | -12 | 36 | 6 | 5 | 10 | 50 | 150 | 30 |
| 1 | -2 | -2 | 4 | 7 | 4 | 23 | 92 | 112 | 28 |
| 6 | -1 | -6 | 6 | 9 | 3 | -2 | -6 | 81 | 27 |
| 4 | 0 | 0 | 0 | 1 | 2 | 4 | 8 | 4 | 2 |
| 6 | 1 | 6 | 6 | 6 | 1 | -15 | -15 | 6 | 6 |
| 6 | 2 | 12 | 24 | 6 | 0 | -3 | 0 | 0 | 0 |
| 5 | 3 | 15 | 45 | 4 | -1 | 4 | -4 | 4 | -4 |
| 8 | 4 | 32 | 128 | 2 | -2 | 6 | -12 | 8 | -4 |
| 6 | 5 | 30 | 150 | 4 | -3 | -17 | 51 | 36 | -12 |
| 4 | 6 | 24 | 144 | 6 | -4 | -9 | 36 | 96 | -24 |
| 3 | 7 | 21 | 147 | 2 | -5 | -15 | 75 | 50 | -10 |
| 2 | 8 | 16 | 128 | 2 | -6 | -4 | 24 | 72 | -12 |
| 3 | 9 | 27 | 243 | 1 | -7 | 2 | -14 | 49 | -7 |
| 77 | | 49 | 1785 | 1 | -8 | -2 | -16 | 64 | -8 |
| | | | | 1 | -9 | -1 | 9 | 81 | -9 |
| | | | | 1 | -10 | -5 | 50 | 100 | -10 |
| | | | | 77 | | 49 | 958 | 2233 | 145 |

$SXf_x = 49$ $\qquad$ $SYf_y = 145$

$SX^2f_x = 1785$ $\qquad$ $SY^2f_y = 2233$

$(SXf_x)^2/n = \frac{2401}{77} = 31.18$

$(SYf_y)^2/n = \frac{21025}{77} = 273.05$

$S_x^2 = 1785 - 31.18 = 1753.82$

$S_y^2 = 2233 - 273.05 = 1959.95$

$SXY = 958$

$(SXf_x)(SYf_y)/n = (49)(145)/n = \frac{7105}{77} = 92.27$

$S_{xy} = 958 - 92.27 = 865.73$

$$r = \frac{Sxy}{\sqrt{(Sx^2)\ (Sy^2)}} = \frac{865.73}{\sqrt{(1753.82\ (1959.95)}} = \frac{865.73}{1854.60} = .467$$

---

Computation of mean of experimental group first psychology test scores.

| Class-mark | Frequency f | Code Numbers X | Sum of Code Numbers fX | Squares $fX^2$ |
|---|---|---|---|---|
| 63 | 1 | -10 | -10 | 100 |
| 62 | 4 | -9 | -36 | 324 |
| 61 | 4 | -8 | -32 | 256 |
| 60 | 4 | -7 | -28 | 196 |
| 59 | 3 | -6 | -18 | 108 |
| 58 | 2 | -5 | -10 | 50 |
| 57 | 6 | -4 | -24 | 96 |
| 56 | 77 | -3 | -21 | 63 |
| 55 | 9 | -2 | -18 | 36 |
| 54 | 1 | -1 | -1 | 1 |
| 53 | 6 | 0 | 0 | 0 |
| 52 | 6 | 1 | 6 | 6 |
| 51 | 4 | 2 | 8 | 16 |
| 50 | 2 | 3 | 6 | 18 |
| 49 | 4 | 4 | 16 | 64 |
| 48 | 6 | 5 | 30 | 150 |
| 47 | 2 | 6 | 12 | 72 |
| 46 | 2 | 7 | 14 | 98 |
| 45 | 1 | 8 | 8 | 64 |
| 44 | 1 | 9 | 9 | 81 |
| 43 | 1 | 10 | 10 | 100 |
| 42 | 1 | 11 | 11 | 121 |
| | 77 | | -198 | $SfX^2$=2020 |
| | | | 130 | |
| | | | SfX=-68 | |

$I\ (SfX)\ /n = 1\ (-68)\ /77$

$= -\frac{68}{77} = -.883$

$\bar{x} = G \pm I\ (SfX)\ /n$

$= 53 - .883 = 52.12$

$(SfX)^2/n = (-68)^2/77$

$= \frac{4624}{77} = 60.051$

$Sfx^2 = 2020.00$
$\quad\ 60.05$

$Sx^2 = 1959.95$

$$s_{\bar{x}} = \sqrt{s^2/n} = \sqrt{\frac{25.788}{77}}$$

$$= \sqrt{.335} = .5788$$

$$s^2 = I^2 (Sx^2) / n - 1$$

$$\frac{1 (1959.95)}{76} = 25.788$$

$$s = 5.078$$

# FIGURE III

Scattergram of C.C.A. scores and 1st Psychology test scores of control group

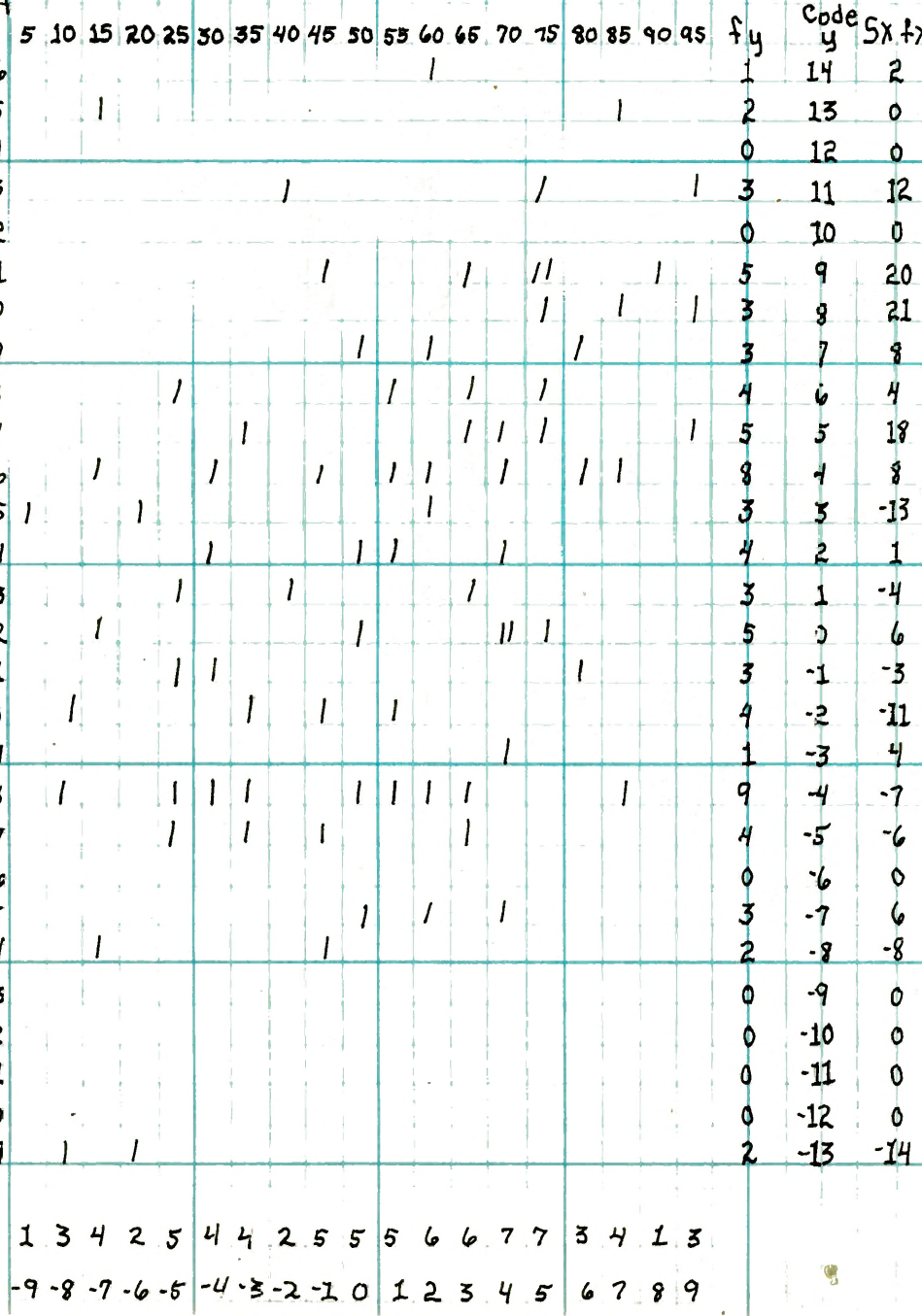


TABLE IV: Computation of the Correlation Coefficient of O.C.A. Scores and First Psychology Test Scores of Control Group.

| $f_x$ | Code X | $SXf_x$ | $SX^2f_x$ | $f_y$ | Code Y | $SXf_x$ | $Y(SXf_x)$ | $SY^2f_y$ | $SYf_y$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -9 | -9 | 81 | 1 | 14 | 2 | 28 | 196 | 14 |
| 3 | -8 | -24 | 192 | 2 | 13 | 0 | 0 | 338 | 26 |
| 4 | -7 | -28 | 196 | 0 | 12 | 0 | 0 | 0 | 0 |
| 2 | -6 | -12 | 72 | 3 | 11 | 12 | 132 | 363 | 33 |
| 5 | -5 | -25 | 125 | 0 | 10 | 0 | 0 | 0 | 0 |
| 4 | -4 | -16 | 64 | 5 | 9 | 20 | 180 | 405 | 45 |
| 4 | -3 | -12 | 36 | 3 | 8 | 21 | 168 | 192 | 24 |
| 2 | -2 | -4 | 8 | 3 | 7 | 8 | 56 | 147 | 21 |
| 5 | -1 | -5 | 5 | 4 | 6 | 4 | 24 | 144 | 24 |
| 5 | 0 | 0 | 0 | 5 | 5 | 18 | 90 | 125 | 25 |
| 5 | 1 | 5 | 5 | 8 | 4 | 8 | 32 | 128 | 32 |
| 6 | 2 | 12 | 24 | 3 | 3 | -13 | 39 | 27 | 9 |
| 6 | 3 | 18 | 54 | 4 | 2 | 1 | 2 | 16 | 8 |
| 7 | 4 | 28 | 112 | 3 | 1 | -4 | -4 | 3 | 3 |
| 7 | 5 | 35 | 175 | 5 | 0 | 6 | 0 | 0 | 0 |
| 3 | 6 | 18 | 108 | 3 | -1 | -3 | 3 | 3 | -3 |
| 4 | 7 | 28 | 196 | 4 | -2 | -11 | 22 | 16 | -8 |
| 1 | 8 | 8 | 64 | 1 | -3 | 4 | -12 | 9 | -3 |
| 3 | 9 | 27 | 243 | 9 | -4 | -7 | 28 | 144 | -36 |
| 77 | | ∠44 | 1760 | 4 | -5 | -6 | 30 | 100 | -20 |
| | | | | 0 | -6 | 0 | 0 | 0 | 0 |
| | | | | 3 | -7 | 6 | -42 | 147 | -21 |
| | | | | 2 | -8 | -8 | 64 | 128 | -16 |
| | | | | 0 | -9 | 0 | 0 | 0 | 0 |
| | | | | 0 | -10 | 0 | 0 | 0 | 0 |
| | | | | 0 | -11 | 0 | 0 | 0 | 0 |
| | | | | 0 | -12 | 0 | 0 | 0 | 0 |
| | | | | 2 | -13 | -14 | 182 | 338 | -26 |
| | | | | 77 | | ∠44 | 1022 | 2969 | ∠131 |

$SXf_x = 44$ $\qquad$ $SYf_y = 131$

$SX^2fx = 1760$ $\qquad$ $SY^2f_y = 2969$

$$(SXf_x)^2/n = \frac{1936}{77} = 25.14$$

$$(SYf_y)^2/n = \frac{17161}{77} = 222.87$$

$Sx^2 = 1760 - 25.14 = 1734.86$

$Sy^2 = 2969 - 222.87 = 2746.13$

$SXY = 1022$

$(\Sigma X f_x)\ (\Sigma Y f_y)\ /n = (44)\ (131)\ /77 = \frac{5764}{77} = 74.86$

$Sxy = 1022 - 74.86 = 947.14$

$$r = \frac{Sxy}{\sqrt{(Sx^2)\ (Sy^2)}} = \frac{947.14}{\sqrt{(1734.86)\ (2746.13)}} = \frac{947.14}{2182.60}$$

$= .434$

---

Computation of mean of first psychology test scores of control group.

| Class-mark | Frequency f | Code Numbers X | Sum of Code Numbers fX | Squares $fX^2$ |
|---|---|---|---|---|
| 66 | 1 | -13 | -13 | 169 |
| 65 | 2 | -12 | -24 | 288 |
| 64 | 0 | -11 | 0 | 0 |
| 63 | 3 | -10 | -30 | 300 |
| 62 | 0 | -9 | 0 | 0 |
| 61 | 5 | -8 | -40 | 320 |
| 60 | 3 | -7 | -21 | 147 |
| 59 | 3 | -6 | -18 | 108 |
| 58 | 4 | -5 | -20 | 100 |
| 57 | 5 | -4 | -20 | 80 |
| 56 | 8 | -3 | -24 | 72 |
| 55 | 3 | -2 | -6 | 12 |
| 54 | 4 | -1 | -4 | 4 |
| 53 | 3 | 0 | 0 | 0 |
| 52 | 5 | 1 | 5 | 5 |
| 51 | 3 | 2 | 6 | 12 |
| 50 | 4 | 3 | 12 | 36 |
| 49 | 1 | 4 | 4 | 16 |
| 48 | 9 | 5 | 45 | 225 |
| 47 | 4 | 6 | 24 | 144 |
| 46 | 0 | 7 | 0 | 0 |
| 45 | 3 | 8 | 24 | 192 |
| 44 | 2 | 9 | 18 | 162 |
| 43 | 0 | 10 | 0 | 0 |
| 42 | 0 | 11 | 0 | 0 |
| 41 | 0 | 12 | 0 | 0 |
| 40 | 0 | 13 | 0 | 0 |
| 39 | 2 | 14 | 28 | 392 |
| | 77 | | -220 | 2787 |
| | | | 166 | |
| | | | $\Sigma fX = -54$ | |

$I\,(SfX)\,/n = \frac{-54}{77} = -.701$

$\bar{x} = G \neq I\,(SfX)\,/n = 53. - .701$

$= 52.29$

$s_{\bar{x}} = \sqrt{s^2/n} = \sqrt{\frac{36.172}{77}}$

$= \sqrt{.470} = .6855$

$(SfX)^2/n = (-54)^2/77 = \frac{2916}{77}$

$= 37.87$

$SfX^2 = 2787.00$

$(SfX)^2/n = 37.87$

$Sx^2 = 2749.13$

$s^2 = I^2\,(Sx^2)\,/n - 1$

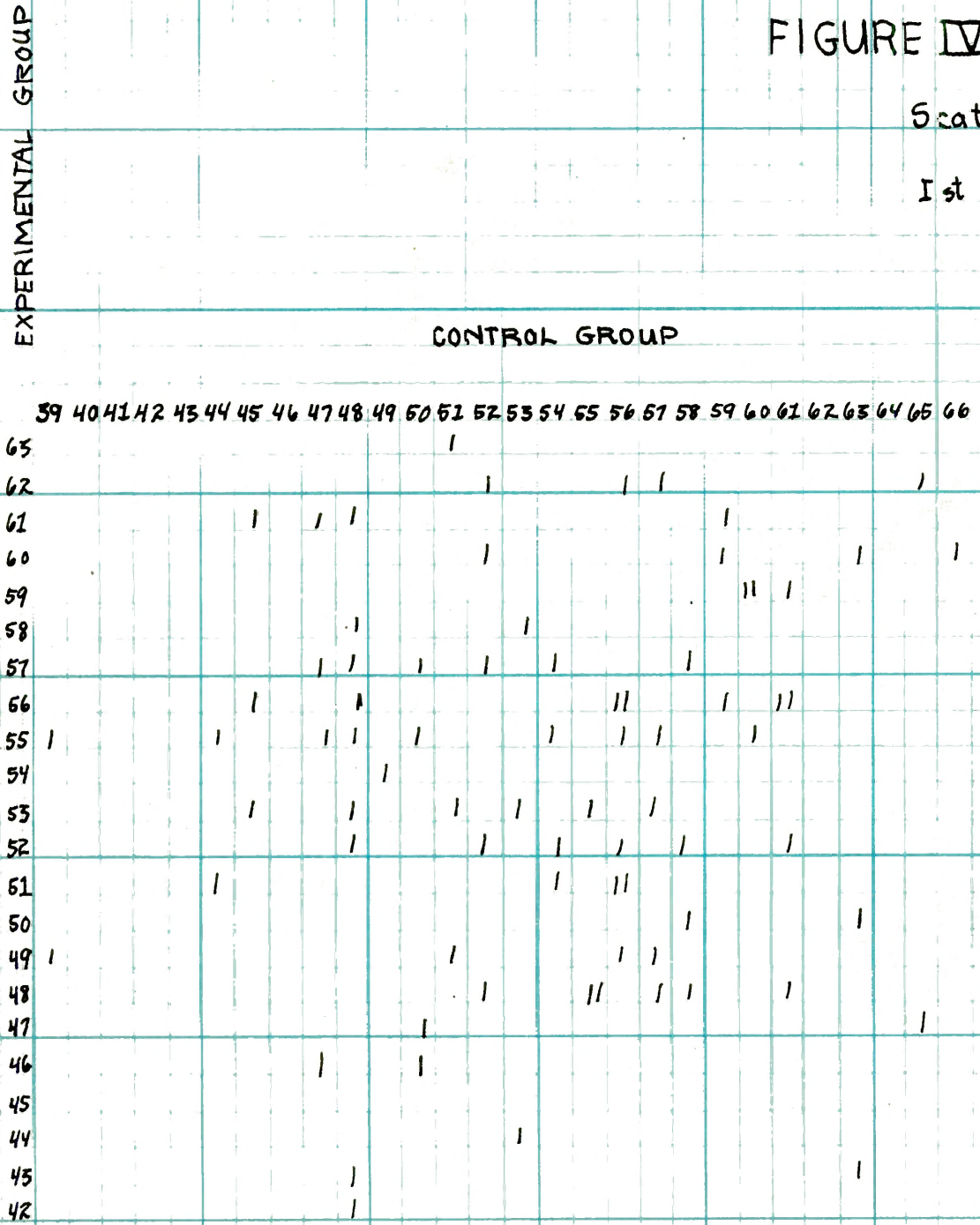
$= \frac{2749.13}{76} = 36.172$ $s = 6.014$

Table III shows a correlation coefficient of .467 between the first psychology test scores and Ohio College Association[2] test scores for the experimental group. Table IV reveals a correlation coefficient of .434 between the first psychology test scores and the Ohio College Association test scores of the control group. These coefficients of correlation are not highly significant, indicating a none too close relationship between Ohio College Association test scores and the Psychology test scores.

# FIGURE IV

Scattergram of experimental and control group

1st psychology test scores




| fy | Code y | SXfx |
|---|---|---|
| 1 | 11 | -1 |
| 4 | 10 | 22 |
| 4 | 9 | -9 |
| 4 | 8 | 32 |
| 3 | 7 | 25 |
| 2 | 6 | -3 |
| 6 | 5 | -3 |
| 7 | 4 | 22 |
| 9 | 3 | -13 |
| 1 | 2 | -3 |
| 6 | 1 | -3 |
| 6 | 0 | 17 |
| 4 | -1 | 2 |
| 2 | -2 | 17 |
| 4 | -3 | -5 |
| 6 | -4 | 26 |
| 2 | -5 | 11 |
| 2 | -6 | -7 |
| 0 | -7 | 0 |
| 1 | -8 | 1 |
| 2 | -9 | 7 |
| 1 | -10 | -4 |

TABLE V: Computation of the Correlation Coefficient of the Experimental and Control Group First Psychology Test Scores.

| $f_x$ | Code X | $SXf_x$ | $SX^2f_x$ | $f_y$ | Code Y | $SXf_x$ | $Y(SXf_x)$ | $SY^2f_y$ | $SYf_y$ |
|---|---|---|---|---|---|---|---|---|---|
| 2 | -13 | -26 | 338 | 1 | 11 | -1 | -11 | 121 | 11 |
| 0 | -12 | 0 | 0 | 4 | 10 | 22 | 220 | 400 | 40 |
| 0 | -11 | 0 | 0 | 4 | 9 | -9 | -81 | 324 | 36 |
| 0 | -10 | 0 | 0 | 4 | 8 | 32 | 256 | 256 | 32 |
| 0 | -9 | 0 | 0 | 3 | 7 | 25 | 175 | 147 | 21 |
| 2 | -8 | -16 | 128 | 2 | 6 | -3 | -18 | 72 | 12 |
| 3 | -7 | -21 | 147 | 6 | 5 | -3 | -15 | 150 | 30 |
| 0 | -6 | 0 | 0 | 7 | 4 | 22 | 88 | 112 | 28 |
| 4 | -5 | -20 | 100 | 9 | 3 | -13 | -39 | 81 | 27 |
| 9 | -4 | -36 | 144 | 1 | 2 | -3 | -6 | 4 | 2 |
| 1 | -3 | -3 | 9 | 6 | 1 | -3 | -3 | 6 | 6 |
| 4 | -2 | -8 | 16 | 6 | 0 | 17 | 0 | 0 | 0 |
| 3 | -1 | -3 | 3 | 4 | -1 | 2 | -2 | 4 | -4 |
| 5 | 0 | 0 | 0 | 2 | -2 | 17 | -34 | 8 | -4 |
| 3 | 1 | 3 | 3 | 4 | -3 | -5 | 15 | 36 | -12 |
| 4 | 2 | 8 | 16 | 6 | -4 | 26 | -104 | 96 | -24 |
| 3 | 3 | 9 | 27 | 2 | -5 | 11 | -55 | 50 | -10 |
| 8 | 4 | 32 | 128 | 2 | -6 | -7 | 42 | 72 | -12 |
| 5 | 5 | 25 | 125 | 0 | -7 | 0 | 0 | 0 | 0 |
| 4 | 6 | 24 | 144 | 1 | -8 | 1 | 8 | 64 | -8 |
| 3 | 7 | 21 | 147 | 2 | -9 | 7 | -63 | 162 | -18 |
| 3 | 8 | 24 | 192 | 1 | -10 | -4 | 40 | 100 | -10 |
| 5 | 9 | 45 | 405 | 77 | | $\not$131 | 413 | 2265 | 143 |
| 0 | 10 | 0 | 0 | | | | | | |
| 3 | 11 | 33 | 363 | | | | | | |
| 0 | 12 | 0 | 0 | | | | | | |
| 2 | 13 | 26 | 338 | | | | | | |
| 1 | 14 | 14 | 196 | | | | | | |
| 77 | | $\not$131 | 2969 | | | | | | |

$SXf_x = 131$

$SX^2f_x = 2969$

$SYf_y = 143$

$SY^2f_y = 2265$

$(SXf_x)^2/n = \frac{17161}{77} = 222.87$

$(SYf_y)^2/n = \frac{20449}{77} = 265.57$

$(SXf_x)(SYf_y)/n = (131)(143)/77 = \frac{18733}{77} = 243.29$

$Sxy = 413 - 243.29 = 169.71$

$$r = \frac{Sxy}{\sqrt{(Sx^2)\ (Sy^2)}} \qquad \frac{169.71}{\sqrt{(2746.13)\ (1999.43)}} = \frac{169.71}{2316.3}$$

$$= .0733$$

Significance of the Difference Between the Correlation Coefficients of the First Psychology Test, Experimental and Control Groups.

$$t = \frac{z_e - z_c}{\sqrt{\frac{1}{n-3} + \frac{1}{n-3}}}$$

By Figure 7.4 of Snedecor the corresponding z for r of the first psychology test experimental group is .505. The corresponding x for r of the first test control group is .465. "n" indicates the number which in each case is 77. Substituting we have:

$$t = \frac{.505 - .465}{\sqrt{\frac{1}{77-3} + \frac{1}{77-3}}} = \frac{.040}{.164} = .25$$

By Table 3.8, page 65, of Snedecor's Statistical Methods, there is evidence to indicate that the two z's and their corresponding r's are not significantly different between themselves. The t score indicated above is well below the 1.990 and 2.638 for the confidence limits at the 5% and 1% levels.

Significance of the Difference Between the Means of the First Psychology Test Scores of Experimental and Control Groups.

$\bar{x}_c$ = 52.29 (From Table IV)

$\bar{x}_e$ = 52.12 (From Table III)

$s_{\bar{x}_c}$ = .685 (From Table IV)

$s_{\bar{x}_e}$ = .579 (From Table III)

r = .733 (From Table V)

The following formula is used to find the significance of the difference between the means:

$$s_{\bar{x}_c - \bar{x}_e} = \sqrt{s_{\bar{x}_c}^2 + s_{\bar{x}_e}^2 - 2r\, s_{\bar{x}_c}\, s_{\bar{x}_e}}$$

Substituting the numbers for the symbols, we have:

$$s_{\bar{x}_c - \bar{x}_e} = \sqrt{(.685)^2 + (.579)^2 - (2)(.733)(.685)(.579)}$$

$$= \sqrt{.469 + .335 - (1.466)(.397)}$$

$$= \sqrt{.804 - .0582} = \sqrt{.746} = .864$$

The computation of the significance between the means of experimental and control group first psychology test scores indicates that the means of the two groups are drawn from the same population at both the 5% and 1% level of confidence. Table III reveals a mean of 52.12 points for the experimental group first psychology test. Table IV show a mean of 52.29

points for the control group first psychology test. This indicates that the control group scored .17 test points higher than the experimental group on the initial tests on the basis of the means. Thus, at the beginning of the study, the groups were identical.

$$t = \frac{\bar{x}_c - \bar{x}_e}{s_{\bar{x}_c - \bar{x}_e}}$$

By substitution, we have:

$$t = \frac{52.29 - 52.12}{.864} = .2$$

From Table 3.8 of Snedecor for 80 degrees of freedon, the confidence limits at the 5% level and the 1% level are respectively 1.990 and 2.638. Since .2 is less than the 5% and 1% levels, the statement can be made that the means of these scores are from the same population at 5% and 1% levels of confidence. The experiment begins then with both groups equal.

Also the correlation coefficient of .999 (Table II) between the O.C.A. scores of the experimental group and the control group equates the two groups very closely in the initial stage of the problem.

# FIGURE V

Scattergram of O.C.A scores and Final psych. test scores of experimental group

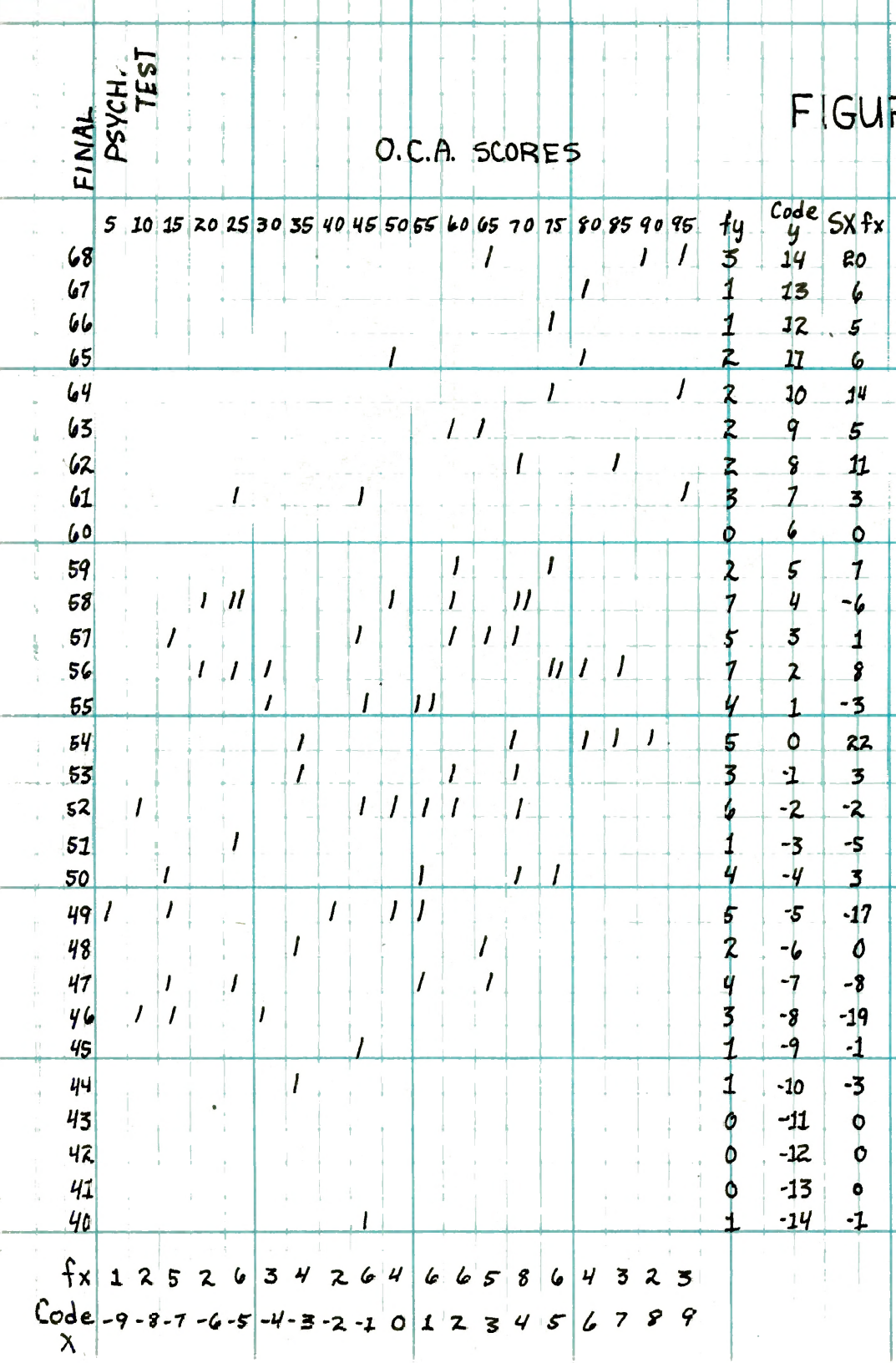


TABLE VI: Computation of the Correlation Coefficient of the O.C.A. Scores and Final Psychology Test Scores of the Experimental Group.

| $f_x$ | Code X | $SXf_x$ | $SX^2f_x$ | $f_y$ | Code Y | $SXf_x$ | $Y(SXf_x)$ | $SY^2f_y$ | $SYf_y$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -9 | -9 | 81 | 3 | 14 | 20 | 280 | 588 | 42 |
| 2 | -8 | -16 | 128 | 1 | 13 | 6 | 78 | 169 | 13 |
| 5 | -7 | -35 | 245 | 1 | 12 | 5 | 60 | 144 | 12 |
| 2 | -6 | -12 | 72 | 2 | 11 | 6 | 66 | 242 | 22 |
| 6 | -5 | -30 | 150 | 2 | 10 | 14 | 140 | 200 | 20 |
| 3 | -4 | -12 | 48 | 2 | 9 | 5 | 45 | 162 | 18 |
| 4 | -3 | -12 | 36 | 2 | 8 | 11 | 88 | 128 | 16 |
| 1 | -2 | -2 | 4 | 3 | 7 | 3 | 21 | 147 | 21 |
| 6 | -1 | -6 | 6 | 0 | 6 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 0 | 2 | 5 | 7 | 35 | 50 | 10 |
| 6 | 1 | 6 | 6 | 7 | 4 | -6 | -24 | 112 | 28 |
| 6 | 2 | 12 | 24 | 5 | 3 | 1 | 3 | 45 | 15 |
| 5 | 3 | 15 | 45 | 7 | 2 | 8 | 16 | 28 | 14 |
| 8 | 4 | 32 | 128 | 4 | 1 | -3 | -3 | 4 | 4 |
| 6 | 5 | 30 | 150 | 5 | 0 | 22 | 0 | 0 | 0 |
| 4 | 6 | 24 | 144 | 3 | -1 | 3 | -3 | 3 | -3 |
| 3 | 7 | 21 | 147 | 6 | -2 | -2 | 4 | 24 | -12 |
| 2 | 8 | 16 | 128 | 1 | -3 | -5 | 15 | 9 | -3 |
| 3 | 9 | 27 | 243 | 4 | -4 | 3 | -12 | 64 | -16 |
| 77 | | 49 | 1785 | 5 | -5 | -17 | 85 | 125 | -25 |
| | | | | 2 | -6 | 0 | 0 | 72 | -12 |
| | | | | 4 | -7 | -8 | 56 | 196 | -28 |
| | | | | 3 | -8 | -19 | 152 | 192 | -24 |
| | | | | 1 | -9 | -1 | 9 | 81 | -9 |
| | | | | 1 | -10 | -3 | 30 | 100 | -10 |
| | | | | 0 | -11 | 0 | 0 | 0 | 0 |
| | | | | 0 | -12 | 0 | 0 | 0 | 0 |
| | | | | 0 | -13 | 0 | 0 | 0 | 0 |
| | | | | 1 | -14 | -1 | 14 | 196 | -14 |
| | | | | 77 | | 49 | 1155 | 3081 | 79 |

$SXf_x = 49$

$SX^2f_x = 1785$

$SYf_y = 79$

$SY^2f_y = 3081$

$(SXf_x)^2/n = \frac{2401}{77} = 31.18$

$(SYf_y)^2/n = \frac{6241}{77} = 81.05$

$Sx^2 = 1785 - 31.18 = 1753.82$

$Sy^2 = 3081 - 81.05 = 2999.95$

$SXY = 1155$

$(SXf_x)\ (SYf_y)\ /n = (49)\ (79)\ /77 = \frac{3871}{77} = 50.27$

$Sxy = 1155 - 50.27 = 1104.73$

$$r = \frac{Sxy}{\sqrt{(Sx^2)\ (Sy^2)}} = \frac{1104.73}{\sqrt{(1753.82)(2999.95)}} = \frac{1104.73}{2293.90} = .482$$

Computation of the Mean of the Final Psychology Test Scores of the Experimental Group.

| Class-mark | Frequency f | Code Numbers X | Sum of Code Numbers fX | Squares $fX^2$ |
|---|---|---|---|---|
| 68 | 3 | -14 | -42 | 588 |
| 67 | 1 | -13 | -13 | 169 |
| 66 | 1 | -12 | -12 | 144 |
| 65 | 2 | -11 | -22 | 242 |
| 64 | 2 | -10 | -20 | 200 |
| 63 | 2 | - 9 | -18 | 162 |
| 62 | 2 | - 8 | -16 | 128 |
| 61 | 3 | - 7 | -21 | 147 |
| 60 | 0 | - 6 | 0 | 0 |
| 59 | 2 | - 5 | -10 | 50 |
| 58 | 7 | - 4 | -28 | 112 |
| 57 | 5 | - 3 | -15 | 45 |
| 56 | 7 | - 2 | -14 | 28 |
| 55 | 4 | - 1 | - 4 | 4 |
| 54 | 5 | 0 | 0 | 0 |
| 53 | 3 | 1 | 3 | 3 |
| 52 | 6 | 2 | 12 | 24 |
| 51 | 1 | 3 | 3 | 9 |
| 50 | 4 | 4 | 16 | 64 |
| 49 | 5 | 5 | 25 | 125 |
| 48 | 2 | 6 | 12 | 72 |
| 47 | 4 | 7 | 28 | 196 |
| 46 | 3 | 8 | 24 | 192 |
| 45 | 1 | 9 | 9 | 81 |
| 44 | 1 | 10 | 10 | 100 |
| 43 | 0 | 11 | 0 | 0 |
| 42 | 0 | 12 | 0 | 0 |
| 41 | 0 | 13 | 0 | 0 |
| 40 | 1 | 14 | 14 | 196 |
| | 77 | | -79 | 3081 |

$I(SfX)/n = -\frac{79}{77} = -1.025$

$\bar{x} = 0 \pm I\,(SfX)\,/n = 54 - 1.025$

$= 52.975$

$s_{\bar{x}} = \sqrt{s^2/n} = \sqrt{\frac{39.473}{77}}$

$= \sqrt{.5135} = .717$

$(SfX)^2/n = (-79)^2/77 = 81.05$

$SfX^2 = 3081$

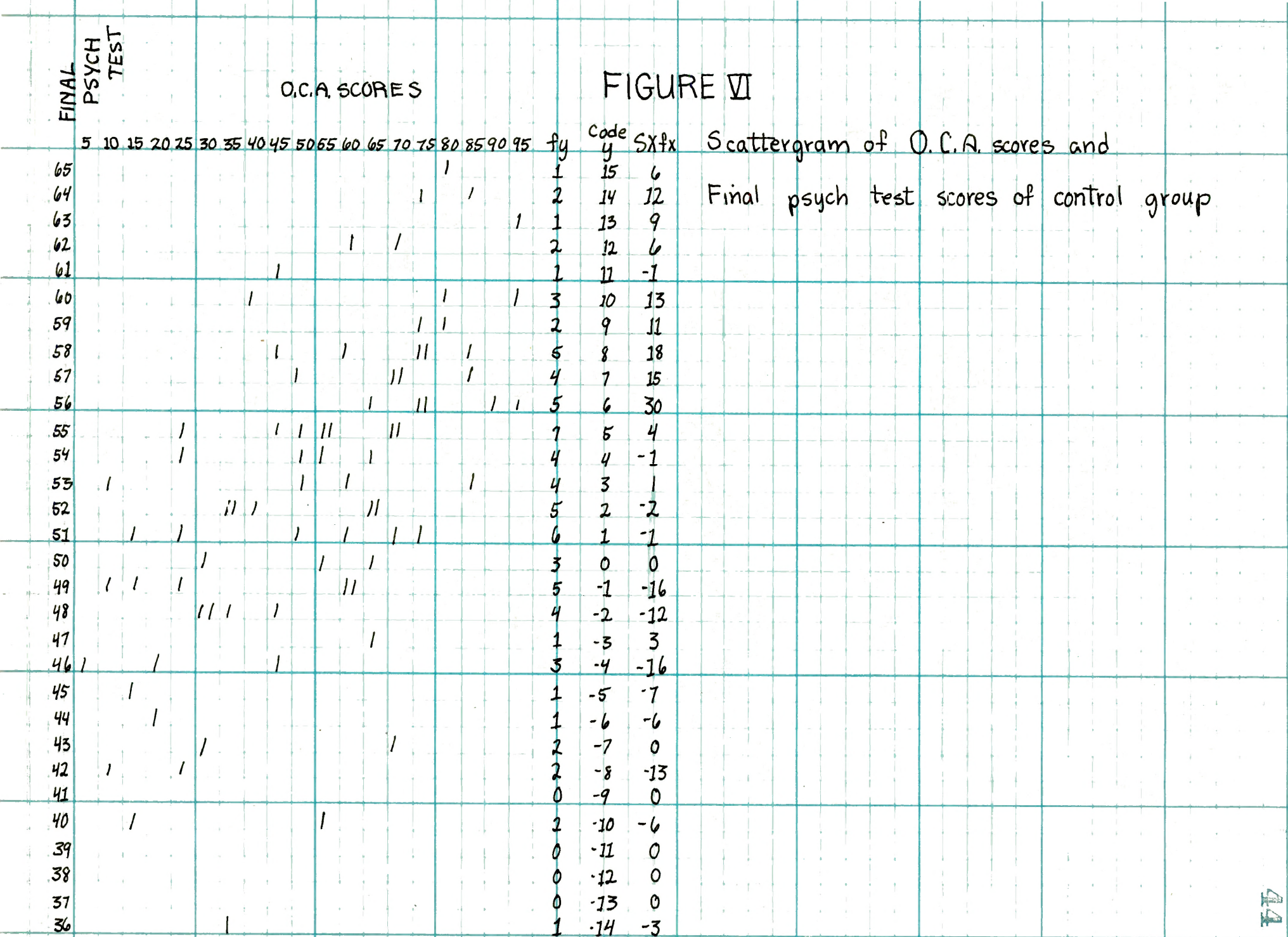
$(SfX)^2/n = 8105$

$Sx^2 = 2999.95$

$s^2 = 1\,(2999.95)\,/76 = 39.473$

$s = 6.28$

# FIGURE VI




| fy | Code y | SXfx |
|---|---|---|
| 1 | 15 | 6 |
| 2 | 14 | 12 |
| 1 | 13 | 9 |
| 2 | 12 | 6 |
| 1 | 11 | -1 |
| 3 | 10 | 13 |
| 2 | 9 | 11 |
| 6 | 8 | 18 |
| 4 | 7 | 15 |
| 5 | 6 | 30 |
| 7 | 5 | 4 |
| 4 | 4 | -1 |
| 4 | 3 | 1 |
| 5 | 2 | -2 |
| 6 | 1 | -1 |
| 3 | 0 | 0 |
| 5 | -1 | -16 |
| 4 | -2 | -12 |
| 1 | -3 | 3 |
| 3 | -4 | -16 |
| 1 | -5 | -7 |
| 1 | -6 | -6 |
| 2 | -7 | 0 |
| 2 | -8 | -13 |
| 0 | -9 | 0 |
| 2 | -10 | -6 |
| 0 | -11 | 0 |
| 0 | -12 | 0 |
| 0 | -13 | 0 |
| 1 | -14 | -3 |

Scattergram of O.C.A. scores and Final psych test scores of control group

TABLE VII: Computation of the Correlation Coefficient of the O.C.A. Scores and Final Psychology Test Scores of the Control Group.

| $f_x$ | Code X | $SXf_x$ | $SX^2f_x$ | $f_y$ | Code Y | $SXf_x$ | $Y(SXf_x)$ | $SY^2f_y$ | $SYf_y$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -9 | -9 | 81 | 1 | 15 | 6 | 90 | 225 | 15 |
| 3 | -8 | -24 | 192 | 2 | 14 | 12 | 168 | 392 | 28 |
| 4 | -7 | -28 | 196 | 1 | 13 | 9 | 117 | 169 | 13 |
| 2 | -6 | -12 | 72 | 2 | 12 | 6 | 72 | 288 | 24 |
| 5 | -5 | -25 | 125 | 1 | 11 | -1 | -11 | 121 | 11 |
| 4 | -4 | -16 | 64 | 3 | 10 | 13 | 130 | 300 | 30 |
| 4 | -3 | -12 | 36 | 2 | 9 | 11 | 99 | 162 | 18 |
| 2 | -2 | -4 | 8 | 5 | 8 | 18 | 144 | 320 | 40 |
| 5 | -1 | -5 | 5 | 4 | 7 | 15 | 105 | 196 | 28 |
| 5 | 0 | 0 | 0 | 5 | 6 | 30 | 180 | 180 | 30 |
| 5 | 1 | 5 | 5 | 7 | 5 | 4 | 20 | 175 | 35 |
| 6 | 2 | 12 | 24 | 4 | 4 | -1 | -4 | 64 | 16 |
| 6 | 3 | 18 | 54 | 4 | 3 | 1 | 3 | 36 | 12 |
| 7 | 4 | 28 | 112 | 5 | 2 | -2 | -4 | 20 | 10 |
| 7 | 5 | 35 | 175 | 6 | 1 | -1 | -1 | 6 | 6 |
| 3 | 6 | 18 | 108 | 3 | 0 | 0 | 0 | 0 | 0 |
| 4 | 7 | 28 | 196 | 5 | -1 | -16 | 16 | 5 | -5 |
| 1 | 8 | 8 | 64 | 4 | -2 | -12 | 24 | 16 | -8 |
| 3 | 9 | 27 | 243 | 1 | -3 | 3 | -9 | 9 | -3 |
| 77 | | 44 | 1760 | 3 | -4 | -16 | 64 | 48 | -12 |
| | | | | 1 | -5 | -7 | 35 | 25 | -5 |
| | | | | 1 | -6 | -6 | 36 | 36 | -6 |
| | | | | 2 | -7 | 0 | 0 | 98 | -14 |
| | | | | 2 | -8 | - 13 | 104 | 128 | -16 |
| | | | | 0 | -9 | 0 | 0 | 0 | 0 |
| | | | | 2 | -10 | -6 | 60 | 200 | -20 |
| | | | | 0 | -11 | 0 | 0 | 0 | 0 |
| | | | | 0 | -12 | 0 | 0 | 0 | 0 |
| | | | | 0 | -13 | 0 | 0 | 0 | 0 |
| | | | | 1 | -14 | -3 | 42 | 196 | -14 |
| | | | | 77 | | 44 | 1480 | 3415 | 213 |

$SXf_x = 44$

$SX^2f_x = 1760$

$(SXf_x)^2/n = \frac{1936}{77} = 25.14$

$(SYf_y)^2/n = \frac{45369}{77} = 589.208$

$Sx^2 = 1760-25.14 = 1734.86$

$Sy^2 = 3415-589.21 = 2825.79$

$SXY = 1480$

$SYf_y = 213$

$SY^2f_y = 3415$

$(SXf_x)\ (SYf_y)\ /n = (44)\ (213)\ /77 = \frac{9372}{77} = 121.71$

$Sxy = 1480 - 121.71 = 1358.29$

$$r = \frac{Sxy}{(Sx^2)\ (Sy)^2} = \frac{1358.29}{(1734.86)(2825.79)} = \frac{1358.29}{2214.10} = .613$$

Computation of the Mean of the Final Psychology Test Scores of the Control Group.

| Class-mark | Frequency f | Code Numbers X | Sum of Code Numbers fX | Squares $fX^2$ |
|---|---|---|---|---|
| 65 | 1 | -15 | -15 | 225 |
| 64 | 2 | -14 | -28 | 392 |
| 63 | 1 | -13 | -13 | 169 |
| 62 | 2 | -12 | -24 | 288 |
| 61 | 1 | -11 | -11 | 121 |
| 60 | 3 | -10 | -30 | 300 |
| 59 | 2 | - 9 | -18 | 162 |
| 58 | 5 | - 8 | -40 | 320 |
| 57 | 4 | - 7 | -28 | 196 |
| 56 | 5 | - 6 | -30 | 180 |
| 55 | 7 | - 5 | -35 | 175 |
| 54 | 4 | - 4 | -16 | 64 |
| 53 | 4 | - 3 | -12 | 36 |
| 52 | 5 | - 2 | -10 | 20 |
| 51 | 6 | - 1 | - 6 | 6 |
| 50 | 3 | 0 | 0 | 0 |
| 49 | 5 | 1 | 5 | 5 |
| 48 | 4 | 2 | 8 | 16 |
| 47 | 1 | 3 | 3 | 9 |
| 46 | 3 | 4 | 12 | 48 |
| 45 | 1 | 5 | 5 | 25 |
| 44 | 1 | 6 | 6 | 36 |
| 43 | 2 | 7 | 14 | 98 |
| 42 | 2 | 8 | 16 | 128 |
| 41 | 0 | 9 | 0 | 0 |
| 40 | 2 | 10 | 20 | 200 |
| 39 | 0 | 11 | 0 | 0 |
| 38 | 0 | 12 | 0 | 0 |
| 37 | 0 | 13 | 0 | 0 |
| 36 | 1 | 14 | 14 | 196 |
| | 77 | | -213 | 3415 |

$I\,(SfX)/n = -\frac{213}{77} = -2.766$

$\bar{x} = G \pm I\,(SfX)/n = 50 - 2.766 = 47.234$

$s_{\bar{x}} = \sqrt{s^2/n} = \sqrt{\frac{33.229}{77}}$

$= \sqrt{.43.5} = .657$

$(SfX)^2/n = (-213)^2/77 = 889.588$

$Sfx^2 = 3415$

$(Sfx)^2/n = 889.588$

$s_x^2 = 2525.412$

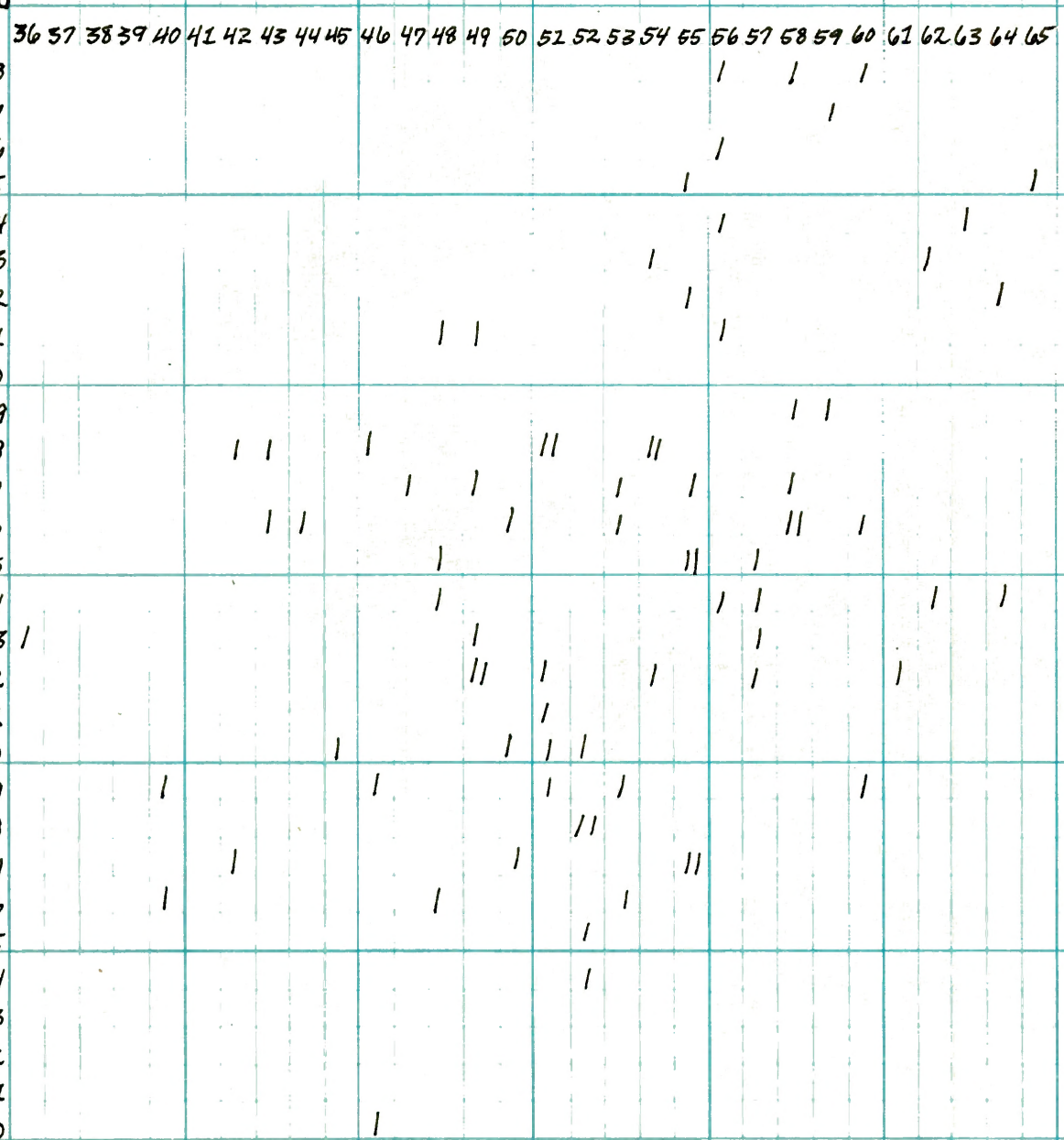
$s^2 = 1\,(2525.412)/76 = 33.229$

$s = 5.764$

# FIGURE VII

EXPERIMENTAL GROUP

CONTROL GROUP




| fy | Code y | SX fx |
|---|---|---|
| 3 | 14 | 24 |
| 1 | 13 | 9 |
| 1 | 12 | 6 |
| 2 | 11 | 20 |
| 2 | 10 | 19 |
| 2 | 9 | 16 |
| 2 | 8 | 17 |
| 3 | 7 | 3 |
| 0 | 6 | 0 |
| 2 | 5 | 17 |
| 7 | 4 | -9 |
| 5 | 3 | 12 |
| 7 | 2 | 14 |
| 4 | 1 | 15 |
| 5 | 0 | 37 |
| 3 | -1 | -8 |
| 6 | -2 | 21 |
| 1 | -3 | 1 |
| 4 | -4 | -2 |
| 6 | -5 | 0 |
| 2 | -6 | 4 |
| 4 | -7 | 2 |
| 3 | -8 | -9 |
| 1 | -9 | 2 |
| 1 | -10 | 2 |
| 0 | -11 | 0 |
| 0 | -12 | 0 |
| 0 | -13 | 0 |
| 1 | -14 | -4 |

Scattergram of experimental and control group final psych. test scores.

TABLE VIII: Computation of the Correlation Coefficient of the Experimental and Control Group Final Psychology Test Scores.

| $f_x$ | Code X | $SXf_x$ | $SX^2f_x$ | $f_y$ | Code Y | $SXf_x$ | $Y(SXf_x)$ | $SY^2f_y$ | $SYf_y$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -14 | -14 | 196 | 3 | 14 | 24 | 336 | 588 | 42 |
| 0 | -13 | 0 | 0 | 1 | 13 | 9 | 117 | 169 | 13 |
| 0 | -12 | 0 | 0 | 1 | 12 | 6 | 72 | 144 | 12 |
| 0 | -11 | 0 | 0 | 2 | 11 | 20 | 220 | 242 | 22 |
| 2 | -10 | -20 | 200 | 2 | 10 | 19 | 190 | 200 | 20 |
| 0 | - 9 | 0 | 0 | 2 | 9 | 16 | 144 | 162 | 18 |
| 2 | - 8 | -16 | 128 | 2 | 8 | 19 | 152 | 128 | 16 |
| 2 | - 7 | -14 | 98 | 3 | 7 | 3 | -21 | 147 | 21 |
| 1 | - 6 | - 6 | 36 | 0 | 6 | 0 | 0 | 0 | 0 |
| 1 | - 5 | - 5 | 25 | 2 | 5 | 17 | 85 | 50 | 10 |
| 3 | - 4 | -12 | 48 | 7 | 4 | -9 | -36 | 112 | 28 |
| 1 | - 3 | - 3 | 9 | 5 | 3 | 12 | 36 | 45 | 15 |
| 4 | - 2 | -8 | 16 | 7 | 2 | 16 | 32 | 28 | 14 |
| 5 | - 1 | -5 | 5 | 4 | 1 | 15 | 15 | 4 | 4 |
| 3 | 0 | 0 | 0 | 5 | 0 | 37 | 0 | 0 | 0 |
| 6 | 1 | 6 | 6 | 3 | -1 | -8 | -8 | 3 | -3 |
| 5 | 2 | 10 | 20 | 6 | -2 | 21 | -42 | 24 | -12 |
| 4 | 3 | 12 | 36 | 1 | -3 | 1 | -3 | 9 | -3 |
| 4 | 4 | 16 | 64 | 4 | -4 | -2 | -8 | 64 | -16 |
| 7 | 5 | 35 | 175 | 5 | -5 | 0 | 0 | 125 | -25 |
| 5 | 6 | 30 | 180 | 2 | -6 | 4 | -24 | 72 | -12 |
| 4 | 7 | 28 | 196 | 4 | -7 | 2 | -14 | 196 | -28 |
| 5 | 8 | 40 | 320 | 3 | -8 | -9 | -72 | 192 | -24 |
| 2 | 9 | 18 | 162 | 1 | -9 | 2 | -18 | 81 | -9 |
| 3 | 10 | 30 | 300 | 1 | -10 | 2 | -20 | 100 | -10 |
| 1 | 11 | 11 | 121 | 0 | -11 | 0 | 0 | 0 | 0 |
| 2 | 12 | 24 | 288 | 0 | -12 | 0 | 0 | 0 | 0 |
| 1 | 13 | 13 | 169 | 0 | -13 | 0 | 0 | 0 | 0 |
| 2 | 14 | 28 | 392 | 1 | -14 | -4 | 56 | 196 | -14 |
| 1 | 15 | 15 | 225 | 77 | | 213 | 1231 | 3081 | 79 |
| 77 | | 213 | 3415 | | | | | | |

$SXf_x = 213$

$SX^2f_x = 3415$

$SYf_y = 79$

$SY^2f_y = 3081$

$(SXf_x)^2/n = \frac{45369}{77} = 589.21$

$(SYf_y)^2/n = \frac{6241}{77} = 81.05$

$Sx^2 = 3415 - 589.21 = 2825.79$

$Sy^2 = 3081 - 81.05 = 2999.95$

$SXY = 1231$

$(SXf_x)(SYf_y)/n = (213)(79)/77 = 218.53$

$Sxy = 1231 - 218.53 = 1012.47$

$$r = \frac{Sxy}{\sqrt{(Sx^2)(Sy^2)}} \qquad \frac{1012.47}{\sqrt{(2825.79)(2999.95)}} = \frac{1012.47}{2911.60} = .4775$$

TABLE IX: Significance of the Difference Between the Correlation Coefficient of Final Psychology Test Scores and O.C.A. Scores of the Experimental and Control Groups.

From Figure 7.4 Snedecor the "z" corresponding to the "r" of the control group final psychology test scores and O.C.A. scores (Table VII r = .613) is .714. For the experimental group (Table VI, r = 482) is .525.

$$t = \frac{z_c - z_e}{\sqrt{\frac{1}{n-3} + \frac{1}{n-3}}} = \frac{.714 - .525}{\sqrt{\frac{1}{77-3} + \frac{1}{77-3}}}$$

$$= \frac{.189}{.027} = \frac{189}{.164} = 1.15$$

Table VI reveals a correlation coefficient of .482 between the Ohio College Association Test scores and the final psychology test scores of the Experimental group. Table VII indicates a correlation coefficient of .613 between the Ohio College Association Test scores and final psychology test scores of the control group. The computation of the difference between the two correlation coefficient (Table IX) indicates that the two r's approach significance in difference at the 1% level.

$\bar{x}_c$ = 47.234 (From Table VII)

$\bar{x}_e$ = 52.975 (From Table VI)

$s_{\bar{x}_c}$ = .657 (From Table VII)

$s_{\bar{x}_e}$ = .717 (From Table VI)

r = 4775 (From Table VIII)

The following formula is used to find the significance of the difference between the means.

$$s_{\bar{x}_e - \bar{x}_c} = \sqrt{s^2_{\bar{x}_e} + s^2_{\bar{x}_c} - 2r\, s_{\bar{x}_e}\, s_{\bar{x}_c}}$$

Substituting the numbers for the symbols we have:

$$s_{\bar{x}_e - \bar{x}_c} = \sqrt{(.717)^2 + (.657)^2 - 2(.478)\,(.717)\,(.657)}$$

$$= \sqrt{.514 + .432 - (.956)\,(.471)}$$

$$\sqrt{.946 - .450} = \sqrt{.496} = .704$$

$$t = \frac{\bar{x}_e - \bar{x}_c}{s_{\bar{x}_e} - s_{\bar{x}_c}} = \frac{52.975 - 47.234}{.704} = 8.152$$

The evidence here, by reason of Table 3.8 of Snedecor, indicates that the groups are not part of the same population at the 5% or the 1% level of significance. The computation of the significance of the difference between the means of

final experimental and control group psychology test scores indicates a highly significant difference in the means of the two groups. A "t" of 8.152 is far outside the limits at either the 1% or 5% level of significance. Table VI shows a mean of 52.975 test points for the experimental group final psychology test scores. Table VII reveals a mean of 47.234 test points for the control group final psychology test scores. This represents a mean gain of 5.741 test points for the experimental group over the control group.

Part II

## EXPERIMENT CONCLUDED

As soon as the two groups had been equated in terms of the divisions explained in Part I, and it had been ascertained that the two groups (experimental and control) were equivalent in terms of O.C.A. and 1st psychology test scores (as well as internally consistent from 1st test to final test) it became the task to determine the effect that the Study Aid Pamphlet had brought about in the output of the experimental group. A number of comparisons were necessary:

1. To determine whether or not the performance of the experimental group varied from 1st psychology test to 2nd psychology test.
2. To determine whether or not the performance of the control group varied from 1st psychology test to 2nd psychology test.
3. To determine the difference, if any, that distinguished between the control and experimental groups in terms of variation from test to test.

The computation for the control group was of particular importance in that it gave an index of the variation in difficulty of the two tests(1st and 2nd psychology tests).

The results of the previous computations, displayed in tables X and XI, are of interest: first, the experimental group differed from first psychology test to final psychology test, to the extent of a "t" value of 1.814. It is evident

that the experimental group as described by the results of the final psychology test could almost be considered a new population. Second, the control group has suffered a rather large loss in output "t" = -1.3988. This would indicate that the second psychology test, since we speak now of the control group, was more difficult (to nearly a significant degree) than the first psychology test. The fact, of course, must be taken into consideration in future analysis, when an attempt is made to determine the extent to which the Study Aid Pamphlet influenced the output of the experimental group. Third, observation of Table XI reveals that the two groups, control and experimental, are significantly different in terms of the degree and direction in which they varied from 1st psychology test to final psychology test.

TABLE X: Computation of Differences Between the Means and "t" Value of the First and Final Psychology Tests of the Experimental and Control Groups.

| | $X=X_{1_e}-X_{2_e}$ | $x=X-\bar{X}$ | $x_e^2$ | $X=X_{1_c}-X_{2_c}$ | $x=X-\bar{X}$ | $x_c^2$ |
|---|---|---|---|---|---|---|
| 1. | 4 | 2.83 | 8.0089 | 0 | .94 | .8836 |
| 2. | 2 | .83 | .6889 | -4 | -3.06 | 9.3636 |
| 3. | 6 | 4.83 | 23.3289 | 3 | 3.94 | 15.5236 |
| 4. | 2 | 183 | .6889 | -5 | -4.06 | 16.4836 |
| 5. | 9 | 7.83 | 61.3089 | -2 | -1.06 | 1.1236 |
| 6. | 0 | -1.17 | 1.3689 | -1 | -1.06 | .0036 |
| 7. | -1 | -2.17 | 4.7089 | 5 | 5.94 | 35.2836 |
| 8. | -2 | -3.17 | 10.0489 | 1 | 1.94 | 3.7636 |
| 9. | 5 | 3.83 | 14.6689 | 4 | 4.94 | 24.4036 |
| 10. | 5 | 3.83 | 14.6689 | 6 | 6.94 | 48.1636 |
| 11. | 4 | 2.83 | 8.0089 | 8 | 8.94 | 79.9236 |
| 12. | 2 | .83 | .6889 | 6 | 6.94 | 48.1636 |
| 13. | 0 | -1.17 | 1.3689 | -3 | -2.06 | 4.2436 |
| 14. | 6 | 4.83 | 23.3289 | 4 | 4.94 | 24.4036 |
| 15. | -5 | -6.17 | 38.0689 | -6 | -5.06 | 25.6036 |
| 16. | 5 | 3.83 | 14.6689 | -5 | -4.06 | 16.4836 |
| 17. | 6 | 4.83 | 23.3289 | -5 | -4.06 | 16.4836 |
| 18. | 4 | 2.83 | 8.0089 | -1 | -.06 | .0036 |
| 19. | 1 | -.17 | .0289 | 3 | 3.94 | 15.5236 |
| 20. | -5 | -6.17 | 38.0689 | -1 | -.06 | .0036 |
| 21. | -9 | -10.17 | 103.4289 | 5 | 5.94 | 35.2836 |
| 22. | 2 | .83 | .6889 | -2 | -1.06 | 1.1236 |
| 23. | 4 | 2.83 | 8.0089 | 2 | 2.94 | 8.6436 |
| 24. | 5 | 3.83 | 14.6689 | 3 | 3.94 | 15.5236 |
| 25. | 6 | 4.83 | 23.3289 | 5 | 5.94 | 35.2836 |
| 26. | -6 | -7.17 | 51.4089 | -9 | -8.06 | 64.9636 |
| 27. | 7 | 5.83 | 33.9889 | 8 | 8.94 | 79.9236 |
| 28. | -10 | -11.17 | 124.7689 | -8 | -7.06 | 49.8436 |
| 29. | -1 | -2.17 | 4.7089 | -5 | -4.06 | 16.4836 |
| 30. | 5 | 3.83 | 14.5689 | 1 | 1.94 | 3.7636 |
| 31. | 2 | .83 | .6889 | 0 | .94 | .8836 |
| 32. | 3 | 1.83 | 3.3489 | 2 | 2.94 | 8.6436 |
| 33. | 3 | 1.83 | 3.3489 | -4 | -3.06 | 9.3636 |
| 34. | 0 | -1.17 | 1.3689 | 4 | 4.94 | 24.4036 |
| 35. | 9 | 7.83 | 61.3089 | 1 | 1.94 | 3.7636 |
| 36. | -3 | -4.17 | 17.3889 | -8 | -7.06 | 49.8436 |
| 37. | 9 | 7.83 | 61.3089 | -2 | -1.06 | 1.1236 |
| 38. | 4 | 2.83 | 8.0089 | -1 | -.06 | .0036 |
| 39. | -3 | -4.17 | 17.3889 | 2 | 2.94 | 8.6436 |
| 40. | 6 | -7.17 | 51.4089 | -10 | -9.06 | 82.0836 |
| 41. | 3 | .83 | .6889 | -4 | -3.06 | 9.3636 |
| 42. | -5 | -6.17 | 38.0689 | 1 | 1.94 | 3.7636 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 43. | -1 | -2.17 | 4.7089 | -2 | -1.06 | 1.1236 |
| 44. | 2 | .83 | .6889 | 6 | 6.94 | 48.1636 |
| 45. | 4 | 2.83 | 8.0089 | -1 | -.06 | .0036 |
| 46. | 8 | 6.83 | 46.6489 | 1 | 1.94 | 3.7636 |
| 47. | -12 | -13.17 | 173.4489 | 8 | 8.94 | 79.9236 |
| 48. | -8 | -9.17 | 84.0889 | -15 | -14.06 | 197.6836 |
| 49. | 9 | 7.83 | 61.3089 | 5 | 5.94 | 35.2836 |
| 50. | -3 | -4.17 | 17.3889 | 5 | 5.94 | 35.2836 |
| 51. | 4 | 2.83 | 8.0089 | 1 | 1.94 | 3.7636 |
| 52. | 2 | .83 | .6889 | 14 | 14.94 | 223.2036 |
| 53. | 2 | .83 | .6889 | -11 | -10.06 | 101.2036 |
| 54. | 5 | 3.83 | 14.6689 | 7 | 7.94 | 63.0436 |
| 55. | -9 | -10.17 | 103.4289 | -5 | -4.06 | 16.4836 |
| 56. | -2 | -3.17 | 10.0489 | -12 | -11.06 | 122.3236 |
| 57. | -9 | -10.17 | 103.4289 | 2 | 2.94 | 8.6436 |
| 58. | 8 | 6.83 | 46.6489 | 1 | 1.94 | 3.7636 |
| 59. | 3 | 1.83 | 3.3489 | -8 | -7.06 | 49.8436 |
| 60. | 3 | 1.83 | 3.3489 | -8 | -7.06 | 49.8436 |
| 61. | -12 | -13.17 | 173.4489 | 0 | .94 | .8836 |
| 62. | 1 | -.17 | .0289 | -4 | -3.06 | 9.3636 |
| 63. | 2 | .83 | .6889 | 0 | .94 | .8836 |
| 64. | -3 | -4.17 | 17.3889 | -5 | -4.06 | 16.4836 |
| 65. | 10 | 8.83 | 77.9689 | -4 | -3.06 | 9.3636 |
| 66. | -6 | -7.17 | 51.4089 | 2 | 2.94 | 8.6436 |
| 67. | 19 | 17.83 | 317.9089 | 1 | 1.94 | 3.7636 |
| 68. | 5 | 3.83 | 14.6689 | -9 | -8.06 | 64.9636 |
| 69. | 1 | -.17 | .0289 | 5 | 5.94 | 35.2836 |
| 70. | -1 | -2.17 | 4.7089 | 1 | 1.94 | 3.7636 |
| 71. | -1 | -7.17 | 51.4089 | -12 | -11.06 | 122.3236 |
| 72. | 8 | 6.83 | 46.6489 | -7 | -6.06 | 36.7236 |
| 73. | 2 | .83 | .6889 | -14 | -13.06 | 150.5636 |
| 74. | -5 | -6.17 | 38.0689 | -6 | -5.06 | 25.6036 |
| 75. | -1 | -2.17 | 4.7089 | 3 | 3.94 | 15.5236 |
| 76. | 3 | 1.83 | 3.3489 | 10 | 10.94 | 119.6836 |
| 77. | 1 | -.17 | .0289 | -9 | -8.06 | 64.9636 |
| | 90 | | 2432.79 | -72 | | 2630.68 |

$\bar{x} = \frac{90}{77} = 1.17$

$\bar{x} = \frac{-72}{77} = -.94$

Experimental Group:

$s^2 = Sx^2/n-1$

$s^2 = 2432.79/76 = 32.01039$

$s_{\bar{x}}^2 = s^2/n = 32.0104/77 = .415719$

$s_{\bar{x}} = \sqrt{.415719} = .645$

$t = \bar{x}/s_{\bar{x}} = 1.17/.645 = 1.814$

$\bar{x} = 1.17$ = Gain per person in this group on final test.

Control Group:

$s^2 = Sx^2/n-1 = 2630.68/76 = 34.6142$

$s_{\bar{x}}^2 = s^2/n = 34.6142/77 = .449535$

$s_{\bar{x}} = \sqrt{.449535} = .672$

$t = \bar{x}/s_{\bar{x}} = -.94/.672 = -1.398809$

$\bar{x} = -.94$ = The loss per student in this group on the final test.

Table X shows a difference between the mean of the first and final psychology test scores for the experimental group of 1.17 test points per student on the final psychology test. Table X also indicates a difference between the mean of the first and final psychology test scores of -.94 test points per student for the control group. The "t" of 1.814 express the difference between the first and the final psychology test in the experimental group. These students actually increased their performance on the final test. The "t" of 1.399 is computed for the differences exhibited by the control group on the first and final psychology tests. Actually, however, the students that composed this group had performed at a less efficient level

than they had on the first test.

TABLE XI: Computation for Comparison of the Two Groups (Experimental and Control) for the Variation on First and Final Psychology Test Scores.

| | Number | D.F. | Mean of the Differences | Sum of Squares |
|---|---|---|---|---|
| Experimental | 77 | 76 | 1.17(TableX) | 2432.79 (Table X) |
| Control | 77 | 76 | -.94(TableX) | 2630.68 (Table X) |
| | | 152 | $\bar{x}$ =2.11 | $Sx^2$=5063.47 |

$$s^2 = Sx^2/n = 5063.47/152 = 33.3123$$

$$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{2\,s^2/n} = \sqrt{2(33.3123)/77} = \sqrt{66.4246/77}$$

$$= \sqrt{.865254} = .930$$

$$t = \bar{x}/s_{\bar{x}} = 2.11/.93 = 2.2688$$

Table XI reveals a "t" of 2.2688 which indicates the fact that the mean variations of the experimental and control groups were significantly different. The experimental group varied in improving its performance while the control group lost points in the final psychology test.

For the next computations, the data derived from the experimental group of students was used. All of the data, the O.C.A. scores, the Study Habit Inventory scores, the first psychology test and final psychology test scores and the mean difference scores, was divided on the basis of the degree of useage to which the Study Aid Pamphlet was put. All of the students who use the pamphlet to the extent of 1-25, or 26-50 or 51-75 or 76-99 were placed in their respective groups. The mean O.C.A. score, Study Habits Inventory score, and mean difference was determined for each group. The "t" value of each mean difference was ascertained. In order to more clearly explain the results of the analysis just outlined, the data will be discussed in terms of the four groups; Group I (1-25), Group II (26-50), Group III (51-75), Group IV (76-99). These divisions, as from 1-25, indicate the degree of use, on the basis of a one hundred percentile scale, to which the student put the Study Aid Pamphlet.

The first group (1-25) indicated that they had made little use of the Study Aid Pamphlet. The "t" value of their variation from first psychology test to final psychology test was a -.8771. Actually, they lost points on the second test. This "t" value was determined as illustrated in Table XII. It is evident that this computation does not indicate the true value of the Study Aid Pamphlet, for, as has been mentioned previously, the second test was more difficult than the first test. The mean second test score of this portion of the experimental group was then equated with the mean final test score of the control group. The "t" value of (2.374) indicates that the two groups (two means) were significantly

different.

Even the individual who had made little use of the Study Aid Pamphlet (according to their own rating) achieved significantly better results on the final psychology test than did the members of the control group.

TABLE XII: Computation of Variation from First Psychology Test to Final Psychology Test (of group rating themselves, (1-25) on the use of the pamphlet.

| | OCA | Study Habit Inventory | 1st. Psych. Test | 2nd. Psych Test | $X=X_1X_2$ | $x=(X-\bar{x})$ | $x^2$ |
|---|---|---|---|---|---|---|---|
| 1. | 86 | 17 | 62 | 62 | 0 | -1.87 | 3.4969 |
| 2. | 77 | -11 | 56 | 56 | 0 | -1.87 | 3.4969 |
| 3. | 75 | -3 | 50 | 56 | 6 | 7.87 | 61.9369 |
| 4. | 71 | -26 | 62 | 57 | -5 | -3.13 | 9.7969 |
| 5. | 61 | 7 | 60 | 63 | 3 | 4.87 | 23.7169 |
| 6. | 45 | -4 | 48 | 40 | -8 | -6.13 | 37.5769 |
| 7. | 36 | -52 | 53 | 44 | -9 | -7.13 | 50.8369 |
| | 451 | -72 | 391 | 378 | -13 | | 190.8583 |
| | $\bar{x}$=64.42 | $\bar{x}$=-10.28 | $\bar{x}$ =55.86 | $\bar{x}$= 54 | $\bar{x}$=-.187 | | |

$$s^2 = Sx^2/n - 1$$
$$= 190.8583 / 6$$
$$= 31.8097$$

$$s_{\bar{x}}^2 = s^2/n = 31.8097/7 = 4.544242$$

$$s_{\bar{x}} = \sqrt{4.544242} = 2.132$$

$$t = \bar{x} / s_{\bar{x}} = -1.87/2.132 = -.8771$$

TABLE XIII: Computation for Comparison of Final Psychology Control Group Test Mean and Mean of Experimental Group Who Rated Themselves 1-25 on the use of Study Aid Pamphlet.

| | Number | D.F. | Means | Sum of Squares |
|---|---|---|---|---|
| Control | 77 | 76 | 47.23(Table IX) | 2525.412 (From Table VII) |
| Experimental | 7 | 6 | 54.00(Table XII) | 558.00 |
| | 84 | 82 | 6.77 | 3083.41 |

$s^2 = Sx^2 / D.F. = 3083.41/82 = 37.61$

$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{s^2 (n_1 + n_2)/(n_1)(n_2)} = \sqrt{37.61 (84).(77)(7)}$

$= \sqrt{3159.24/599} = \sqrt{5.898} = 2.43$

$t = \bar{x} / s_{\bar{x}} = 6.77/2.43 = 2.374$

| $x = X - 54$ | | |
|---|---|---|
| | x | $x^2$ |
| 62 | 8 | 64 |
| 56 | 2 | 4 |
| 56 | 2 | 4 |
| 57 | 3 | 9 |
| 63 | 9 | 81 |
| 40 | -14 | 296 |
| 44 | -10 | 100 |
| | | 558 |

The second group (26-50) indicated that they had made less than average or average use of the Study Aid Pamphlet. This increase in useage of the Study Aid Pamphlet is corroborated by the "t" value that indicates the nature of the difference that characterized this group's performance on tests, one and two. The "t" value of -.5714, (Table XIV) though still indicative of a loss of points from test to retest, is less extensive, than was typical of the previous group. When the "second test performance" of this portion of the experimental group was compared with the final psychology test performance of the control group, the real gain exhibited by this group over the previous group, as well as the control group, is more evident. This "t" value of 5.000 (Table XV) which is very significant, is almost twice as large as the equivalent "t" value of the last group. It appears that only moderate use of the Study Aid Pamphlet brings about very beneficial results.

TABLE XIV: Computation of Variation from First Psychology Test to Final Psychology Test (of group rating themselves, (26-50) on the use of the Pamphlet.

| | OCA | Study Habit Inventory. | 1st. Psych. Test | 2nd. Psych Test | $X=X_1-X_2$ | $x=(X-\bar{X})$ | $x^2$ |
|---|---|---|---|---|---|---|---|
| 1. | 95 | 79 | 60 | 64 | 4 | 4.74 | 22.4676 |
| 2. | 92 | 35 | 52 | 54 | 2 | 2.74 | 7.5076 |
| 3. | 85 | 71 | 57 | 56 | -1 | -.26 | .0676 |
| 4. | 85 | 36 | 56 | 54 | -2 | -1.26 | 1.5876 |
| 5. | 76 | 40 | 60 | 66 | 6 | 6.74 | 45.4276 |
| 6. | 76 | -4 | 55 | 50 | -5 | -4.26 | 18.1476 |
| 7. | 71 | -99 | 62 | 53 | -9 | -8.26 | 68.2276 |
| 8. | 68 | -15 | 48 | 54 | 6 | 6.74 | 45.4276 |
| 9. | 68 | 53 | 56 | 50 | -6 | -5.26 | 27.6676 |
| 10. | 63 | 33 | 57 | 47 | -10 | -9.26 | 85.7476 |
| 11. | 63 | 22 | 58 | 63 | 5 | 5.74 | 32.9476 |
| 12. | 61 | -6 | 53 | 53 | 0 | .74 | .5476 |
| 13. | 59 | 6 | 61 | 58 | -3 | -2.26 | 5.1076 |
| 14. | 55 | 110 | 55 | 49 | -6 | -5.26 | 27.6676 |
| 15. | 54 | 0 | 52 | 47 | -5 | -4.26 | 18.1476 |
| 16. | 52 | 17 | 56 | 58 | 2 | 2.74 | 7.5076 |
| 17. | 51 | 1 | 48 | 52 | 4 | 4.74 | 22.4676 |
| 18. | 49 | -6 | 61 | 49 | -12 | -11.26 | 126.7876 |
| 19. | 44 | 17 | 57 | 61 | 4 | 4.74 | 22.4676 |
| 20. | 25 | 9 | 48 | 58 | 10 | 10.74 | 115.3476 |
| 21. | 3 | 38 | 48 | 49 | 1 | 1.74 | 3.0276 |
| | 1295 | 635 | 1160 | 1145 | -15 | | 704.2996 |
| $\bar{X}=$ | 61.66 | $\bar{X}=30.24$ | $\bar{X}=55.23$ | $\bar{X}=$ 54.52 | $\bar{X}=$ -.742 | | |

$$s^2 = Sx^2/n-1$$
$$= 704.2996/20$$
$$= 35.214980$$

$$s^2_{\bar{x}} = s^2/n = 35.214980/21 = 1.6769038$$

$$s_{\bar{x}} = \sqrt{1.6769038} = 1.295$$

$$t = \bar{x}/s_{\bar{x}} = -.74/1.295 = -.5714$$

TABLE XV: Computation for Comparison of Final Psychology Control Group Test Mean and Mean of Experimental Group Who Rated Themselves 26-50 on the Use of Study Aid Pamphlet.

| | Number | D.F. | Means | Sum of Squares |
|---|---|---|---|---|
| Control | 77 | 76 | 47.23(TableIX) | 2525.412 (Table VII) |
| Experimental | 21 | 20 | 54.52(TableXIV) | 631.238 |
| | 98 | 96 | 7.29 | 3156.650 |

$s^2 = Sx^2/D.F. = 3156.65/96 = 32.88$

$$s_{\bar{x}} = \sqrt{s^2(n_1+n_2)/n_1\,n_2} = \sqrt{32.88\,(77+21)/(76)(20)} = \sqrt{3230.24/1520}$$

$$= \sqrt{2.125} = 1.458$$

$$t = \bar{x}/s_{\bar{x}} = 7.29/1.458 = 5.000$$

$x = X - 54.52$

| | X | x | |
|---|---|---|---|
| 1. | 64 | 9.48 | 89.8704 |
| 2. | 54 | -.52 | .2704 |
| 3. | 56 | 1.48 | 2.1904 |
| 4. | 54 | -.52 | .2704 |
| 5. | 66 | 11.48 | 131.7904 |
| 6. | 50 | -4.52 | 20.4304 |
| 7. | 53 | -1.52 | 2.3104 |
| 8. | 54 | -.52 | .2704 |
| 9. | 50 | -4.52 | 20.4304 |
| 10. | 47 | -7.52 | 56.5504 |
| 11. | 63 | 8.48 | 71.9104 |
| 12. | 53 | -1.52 | 2.3104 |
| 13. | 58 | 3.48 | 12.1104 |
| 14. | 49 | -5.52 | 30.4704 |
| 15. | 47 | -7.52 | 56.5504 |
| 16. | 58 | 3.48 | 12.1104 |
| 17. | 52 | -2.52 | 6.3504 |
| 18. | 49 | -5.52 | 30.4704 |
| 19. | 61 | 6.48 | 41.9904 |
| 20. | 58 | 3.48 | 12.1104 |
| 21. | 49 | -5.52 | 30.4704 |
| | | | 631.2384 |

The third group (51-75) indicated that they had used the Study Aid Pamphlet to the extent of about 51-75 percentile. Again the results of the now familiar analysis bear out their claims. Their mean test score, from first psychology test to final psychology test scores varied approximately 1.32 test points. The "t" value of this variation was 1.3615 (Table XVI). Two things will be noticed: First, this is now a positive difference, an increase in "t" value of almost 2.000; Second, this group is almost significantly better in their second test results than they were on the first test. When this group was compared with the control group results on the final psychology test, the effect of the Study Aid Pamphlet is immediately evident. This experimental sub-group (51-75) scored better on the final psychology test to the extent of a "t" value of 5.88.

TABLE XVI: Computation of Variation from First Psychology Test to Final Psychology Test (of group rating themselves, (51-75) on the use of the pamphlet.)

| | OCA | Study Habit Inventory | 1st. Psych. Test | 2nd. Psych. Test | $X=X_1-X_2$ | $x=(X-\bar{x})$ | $x^2$ |
|---|---|---|---|---|---|---|---|
| 1. | 94 | 62 | 59 | 61 | 2 | .84 | .7056 |
| 2. | 93 | 34 | 62 | 68 | 6 | 4.84 | 23.4256 |
| 3. | 81 | 81 | 60 | 65 | 5 | 3.84 | 14.7456 |
| 4. | 80 | 46 | 63 | 67 | 4 | 2.84 | 8.0656 |
| 5. | 78 | 71 | 52 | 54 | 2 | .84 | .7056 |
| 6. | 72 | 79 | 51 | 52 | 1 | -.16 | .0256 |
| 7. | 70 | 65 | 56 | 58 | 2 | .84 | .7056 |
| 8. | 70 | 31 | 54 | 58 | 4 | 2.84 | 8.0656 |
| 9. | 63 | 22 | 49 | 48 | -1 | -2.16 | 4.6656 |
| 10. | 63 | 80 | 55 | 57 | 2 | .84 | .7056 |
| 11. | 62 | 13 | 56 | 59 | 3 | 1.84 | 3.3856 |
| 12. | 59 | 14 | 43 | 52 | 3 | 1.84 | 3.3856 |
| 13. | 57 | 133 | 51 | 55 | 4 | 2.84 | 8.0656 |
| 14. | 56 | 99 | 53 | 50 | -3 | -4.16 | 17.3056 |
| 15. | 54 | -54 | 50 | 52 | 2 | .84 | .7056 |
| 16. | 53 | 20 | 56 | 55 | -1 | -2.16 | 4.6656 |
| 17. | 50 | 4 | 57 | 65 | 8 | 6.84 | 46.7856 |
| 18. | 45 | 55 | 46 | 55 | 9 | 7.84 | 61.4656 |
| 19. | 44 | -6 | 55 | 52 | -3 | -4.16 | 17.3056 |
| 20. | 43 | 96 | 55 | 57 | 2 | .84 | .7056 |
| 21. | 43 | 21 | 43 | 45 | 2 | .84 | .7056 |
| 22. | 41 | 7 | 44 | 49 | 5 | 3.84 | 14.7456 |
| 23. | 36 | 105 | 55 | 53 | -2 | -3.16 | 9.9856 |
| 24. | 36 | 44 | 57 | 48 | -9 | -10.16 | 103.2256 |
| 25. | 31 | 24 | 53 | 56 | 3 | 1.84 | 3.3856 |
| 26. | 28 | 91 | 58 | 46 | -12 | -13.16 | 173.1856 |
| 27. | 27 | 44 | 55 | 56 | 1 | .16 | .0256 |
| 28. | 27 | 16 | 49 | 51 | 2 | .84 | .7056 |
| 29. | 26 | 14 | 61 | 58 | -3 | -4.16 | 17.3056 |
| 30. | 24 | 25 | 53 | 47 | -6 | -7.16 | 51.2656 |
| 31. | 23 | 123 | 42 | 61 | 19 | 17.84 | 318.2656 |
| 32. | 21 | 28 | 55 | 56 | 1 | -.16 | .0256 |
| 33. | 16 | 59 | 51 | 50 | -1 | -2.16 | 4.6656 |
| 34. | 15 | 46 | 52 | 46 | -6 | -7.16 | 51.2656 |
| 35. | 14 | 83 | 47 | 49 | 2 | .84 | .7056 |
| 36. | 13 | 30 | 52 | 47 | -5 | -5.16 | 37.9456 |
| 37. | 11 | -17 | 47 | 46 | -1 | -2.16 | 4.6656 |
| 38. | 11 | -52 | 49 | 52 | 3 | 1.84 | 3.3856 |
| | 1730 | 1654 | 2006 | 2056 | 44 | | 1021.0528 |
| | $\bar{x}$ =45.53 | $\bar{x}$=43.05 | $\bar{x}$=52.79 | $\bar{x}$=54.11 | $\bar{x}$=1.16 | | |

$s^2 = \Sigma x^2/n-1 = 1021.0528/37 = 27.5960$

$s_{\bar{x}}^2 = s^2/n = 27.5960/38 = .726210$

$s_{\bar{x}} = \sqrt{.726210} = .852$

$t = \bar{x} / s_{\bar{x}} = 1.16 / .852 = 1.3615$

TABLE XVII: Computation for Comparison of Final Psychology Control Group Test Mean and Mean of Experimental Group Who Rated Themselves 51-75 on the Use of Study Aid Pamphlet.

| | Number | D.F. | Means | Sum of Squares |
|---|---|---|---|---|
| Control | 77 | 76 | 47.23(Table IX) | 2525.42(Table VII) |
| Experimental | 38 | 37 | 54.11(Table XVI) | 1416.44 |
| | 115 | 113 | 6.88 | 3941.86 |

$s^2 = Sx^2/6(D.F.) = 3941.86/113 = 34.88$

$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{s^2(n_1 + n_2)/(n_1)(n_2)} = \sqrt{34.88(115)/(2926)}$

$= \sqrt{4011.20/2926} = \sqrt{1.37} = 1.171$

$t = \bar{x} / s_{\bar{x}_1 \bar{x}_2} = 6.88/1.17 = 5.8803$

TABLE XVII; Cont.

$\bar{X}$=X-54.11

| | X | x | $x^2$ |
|---|---|---|---|
| 1. | 61 | 6.89 | 47.4721 |
| 2. | 68 | 13.89 | 192.9321 |
| 3. | 65 | 10.89 | 118.5921 |
| 4. | 67 | 12.89 | 166.1521 |
| 5. | 54 | -.11 | .0121 |
| 6. | 52 | -2.11 | 4.4521 |
| 7. | 58 | 4.89 | 23.9121 |
| 8. | 58 | 4.89 | 23.9121 |
| 9. | 48 | -6.11 | 37.3321 |
| 10. | 57 | 3.89 | 15.1321 |
| 11. | 59 | 5.89 | 34.6921 |
| 12. | 52 | -2.11 | 4.4521 |
| 13. | 55 | .89 | .7921 |
| 14. | 50 | -4.11 | 16.8921 |
| 15. | 52 | -2.11 | 4.4521 |
| 16. | 55 | .89 | .7921 |
| 17. | 65 | 10.89 | 118.5921 |
| 18. | 55 | .89 | .7921 |
| 19. | 52 | -2.11 | 4.4521 |
| 20. | 57 | 3.89 | 15.1321 |
| 21. | 45 | -9.11 | 82.9921 |
| 22. | 49 | -5.11 | 26.1121 |
| 23. | 53 | -1.11 | 1.2321 |
| 24. | 48 | -6.11 | 37.3321 |
| 25. | 56 | 1.89 | 3.5721 |
| 26. | 46 | -8.11 | 65.7721 |
| 27. | 56 | 1.89 | 3.5721 |
| 28. | 51 | -3.11 | 9.6721 |
| 29. | 58 | 4.89 | 23.9121 |
| 30. | 47 | -7.11 | 50.5521 |
| 31. | 61 | 6.89 | 47.4721 |
| 32. | 56 | 1.89 | 3.5721 |
| 33. | 50 | -4.11 | 16.8921 |
| 34. | 46 | -8.11 | 65.7721 |
| 35. | 49 | -5.11 | 26.1121 |
| 36. | 47 | -7.11 | 50.5521 |
| 37. | 46 | -8.11 | 65.7721 |
| 38. | 52 | -2.11 | 4.4521 |
| | | | 1416.4398 |

The last group (76-99 indicated that they had made very thorough use of the Study Aid Pamphlet. Since they varied, from first psychology test to final psychology test, to the extent of a positive "t" value of 9.825; it must be assumed that their indication of "Study Aid Pamphlet use" was correct at any rate, they benefited greatly, as well as much more than did the previous groups, from the use of the Study Aid Pamphlet. In order to ascertain the effect of Study Aid Pamphlet on the performance of this group, they were compared with the control group. The "t" value of 6.883 indicates, again, the extreme value that the Study Aid Pamphlet had for these students.

Although the four groups may vary somewhat as far as mean group O.C.A. score is concerned it is interesting to note that each group is comprised of a fairly representative range of O.C.A. scores. Coupling this fact with the gradual increase in test-retest gain from the first to the fourth group, it must be assumed that the students diagnosis of his use of the Study Aid Pamphlet is quite reliable. It indicates further, that use of the Study Aid Pamphlet provides very adequate results; results that vary with the degree of use the student makes of it.

Finally the results indicates that any student, in so far as O.C.A. score is concerned, may improve his class performance significantly if he makes use of the Study Aid Pamphlet.

TABLE XVIII: Computation of Variation from First Psychology Test to Final Psychology Test (of group rating themselves, (76-99) on the use of the pamphlet.

| | OCA | Study Habit Inventory | 1st. Psych. Test | 2nd. Psych. Test | $X = X_1 - X_2$ | $x = (X - \bar{X})$ | $x^2$ |
|---|---|---|---|---|---|---|---|
| 1. | 88 | 62 | 59 | 68 | 9 | 2.82 | 7.9524 |
| 2. | 81 | 92 | 51 | 56 | 5 | -1.18 | 1.3924 |
| 3. | 75 | 34 | 59 | 64 | 5 | -1.18 | 1.3924 |
| 4. | 74 | 53 | 55 | 59 | 4 | -2.18 | 4.7524 |
| 5. | 69 | 18 | 57 | 62 | 5 | -1.18 | 1.3924 |
| 6. | 65 | 45 | 61 | 68 | 7 | .82 | .6724 |
| 7. | 58 | 67 | 48 | 57 | 9 | 2.82 | 7.9524 |
| 8. | 34 | 2 | 46 | 54 | 8 | 1.82 | 3.3124 |
| 9. | 32 | -37 | 52 | 55 | 3 | -3.18 | 10.1124 |
| 10. | 22 | -92 | 53 | 58 | 5 | -1.18 | 1.3924 |
| 11. | 14 | -10 | 49 | 57 | 8 | 1.82 | 3.3124 |
| | 612 | 234 | 590 | 658 | 68 | | 43.6364 |
| | $\bar{X}$ =55.64 | $\bar{X}$=21.27 | $\bar{X}$=53.64 | $\bar{X}$=59.82 | $\bar{X}$=6.18 | | |

$$s^2 = Sx^2/n-1 = 43.6364/10 = 4.3636$$

$$s_{\bar{x}}^2 = s^2/n = 4.3636/11 = .39669 \qquad s_{\bar{x}} = \sqrt{.39669} = .629$$

$$t = \bar{x}/s_{\bar{x}} = 6.18/.629 = 9.825$$

TABLE XIX: Computation for Comparison of Final Psychology Control Group Test Mean and Mean of Experimental Group Who Rated Themselves 76-99 on the Use of Study Aid Pamphlet.

| | Number | D.F. | Means | Sum of Squares |
|---|---|---|---|---|
| Control | 77 | 76 | 47.23(Table IX) | 2525.42 (Table VII) |
| Experimental | 11 | 10 | 59.82(TableXVIII) | 247.54 |
| | 88 | 86 | 12.59 | 2772.96 |

$s^2 = s_x^2/s(D.F.) = 2772.96/86 = 32.24$

$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{s^2(n_1 + n_2)/(n_1)(n_2)} = \sqrt{32.24\ (77 + 11)/(77)(11)}$

$= \sqrt{3837.12/847} = \sqrt{3.3496} = 1.829$

$t = \bar{x}/s_{\bar{x}_1 - \bar{x}_2} = 12.59/1.829 = 6.883$

$x = X - 59.82$

| | X | x | |
|---|---|---|---|
| 1. | 68 | 8.18 | 66.9124 |
| 2. | 56 | -3.82 | 14.5924 |
| 3. | 64 | 4.18 | 17.4724 |
| 4. | 59 | -.82 | .6724 |
| 5. | 62 | 2.18 | 4.7524 |
| 6. | 68 | 8.18 | 66.9124 |
| 7. | 57 | -2.82 | 7.9524 |
| 8. | 54 | -5.82 | 33.8724 |
| 9. | 55 | -4.82 | 23.2324 |
| 10. | 58 | -1.82 | 3. 2124 |
| 11. | 57 | -2.82 | 7.9524 |
| | | | 247.5364 |

Bibliography.

1. Snedecor, George, W, "Statistical Methods", Chapter VIII pp.169-187.

2. Fisher, R.A., Used by Snedecor, Ibid, Figure 7.4, pp. 152-153.

3. Snedecor, Ibid, pp.,152-153.

4. Snedecor, Ibid, pp., 43-44.

5. Snedecor, Ibid, pp., 77.

# CHAPTER V

## Summary, Conclusions, and Recommendations

As related to the aims of the study listed in Chapter I, the writer found:

1. The Control and Experimental groups were compared in terms of their first and last psychology test scores. (Table IX, Table V).
2. The students rendered an opinion or rating of the degree of use to which they put the Study Aid Pamphlet.
3. The Experimental group was broken down into four sub-groups on the basis of this self rating. (1-25, 26-50, 51-75, 76-99).
4. These sub-groups, represented by their scores on the second test, were each compared with their scores on the first test. This computation suggested the amount that each group had improved.
5. Then, to give an index of the true value of the Study Aid Pamphlet, (since the control group had lost points on the second test) each of these sub-groups was then compared with the control group's performance on the final test.

### Conclusions

On the basis of the evidence contained in this study, the writer concludes:

1. The Study Aid Pamphlet benefits the group having used it to the extent that the test scores when compared with

those not using the Study Aid Pamphlet, show a highly significant population difference. A "t" 8.152 is far outside the confidence limit at either the 1% or the 5% level of significance.

2. Comparison of the two groups (experimental and control) for the variation on the first and final psychology test scores produces a "t" of 2.2688 which indicates the fact that the mean variations of the two groups (experimental and control) were significantly different. The experimental group varied in improving its performance while the control group lost points on the final test.

3. The value of the Study Aid Pamphlet was significant for all groups that used it. The value of the Study Aid Pamphlet, however, varied in proportion to the use made of it. Those using the Study Aid Pamphlet to greater extent improved their performance more than did the other groups.

4. Since a representative group of individuals made up each of the four experimental sub groups, representative in so far as O.C.A. scores were concerned, it may be concluded that all students may benefit significantly (in class performance) from the use of the Study Aid Pamphlet. The degree of improvement, again, is an individual matter since it varies in direct proportion to the amount of use a student makes of it.

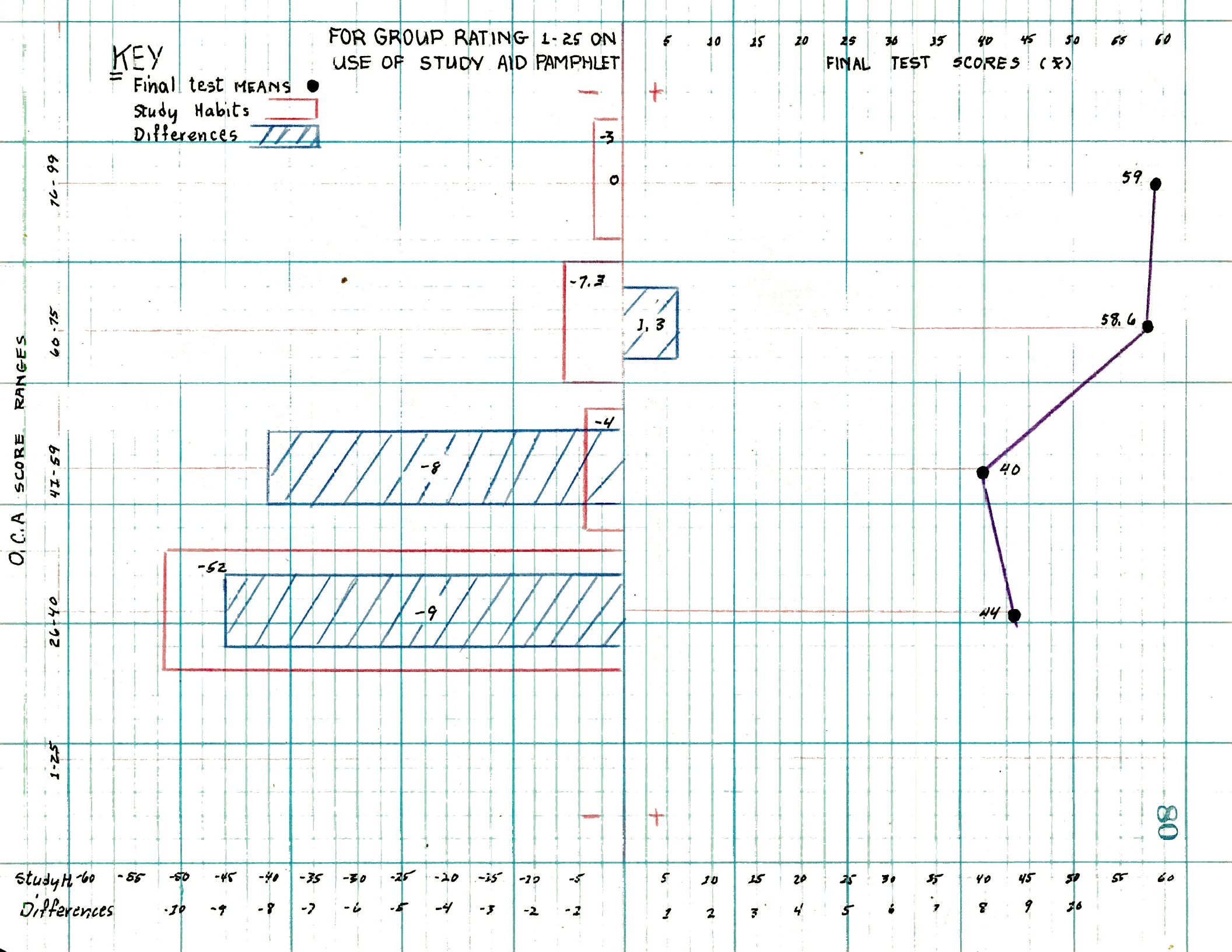
Additional illustrations for the reader who wishes a

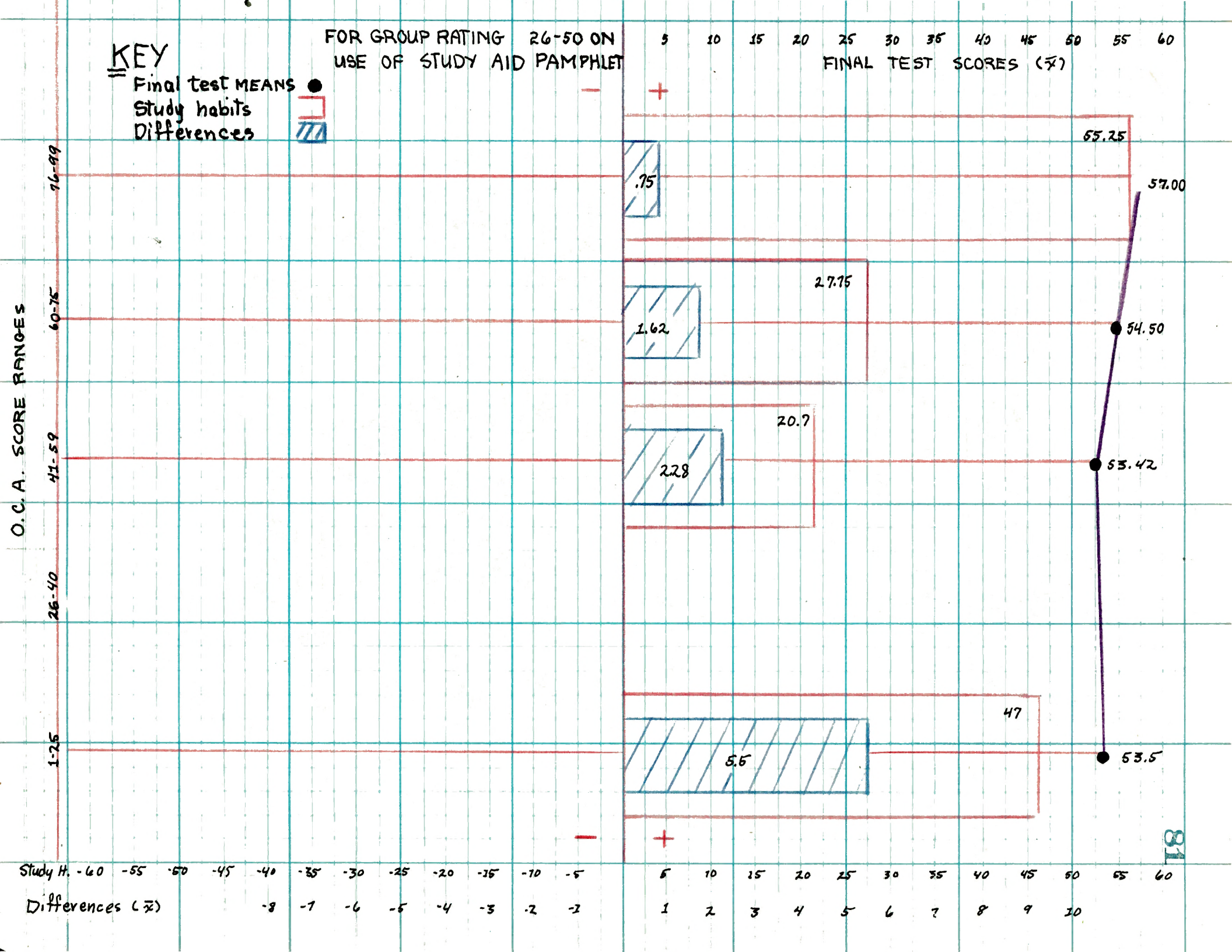
total picture of the problem situation, some comprehensive graphs have been prepared. These graphs, featuring the four breakdown method, illustrate the mean improvement from 1st psychology test to final psychology test, the mean Study Habits Inventory score, and the final test score of each of a number of O.C.A. ranges. It was the purpose of these graphs to further indicate the value of the Study Aid Pamphlet in relation to the O.C.A. score. Thus, the reader is not only presented with the data of the four group breakdowns, (determined on the basis of student use of the Study Aid Pamphlet) but is also given this comprehensive reduction of the intra-group factors.

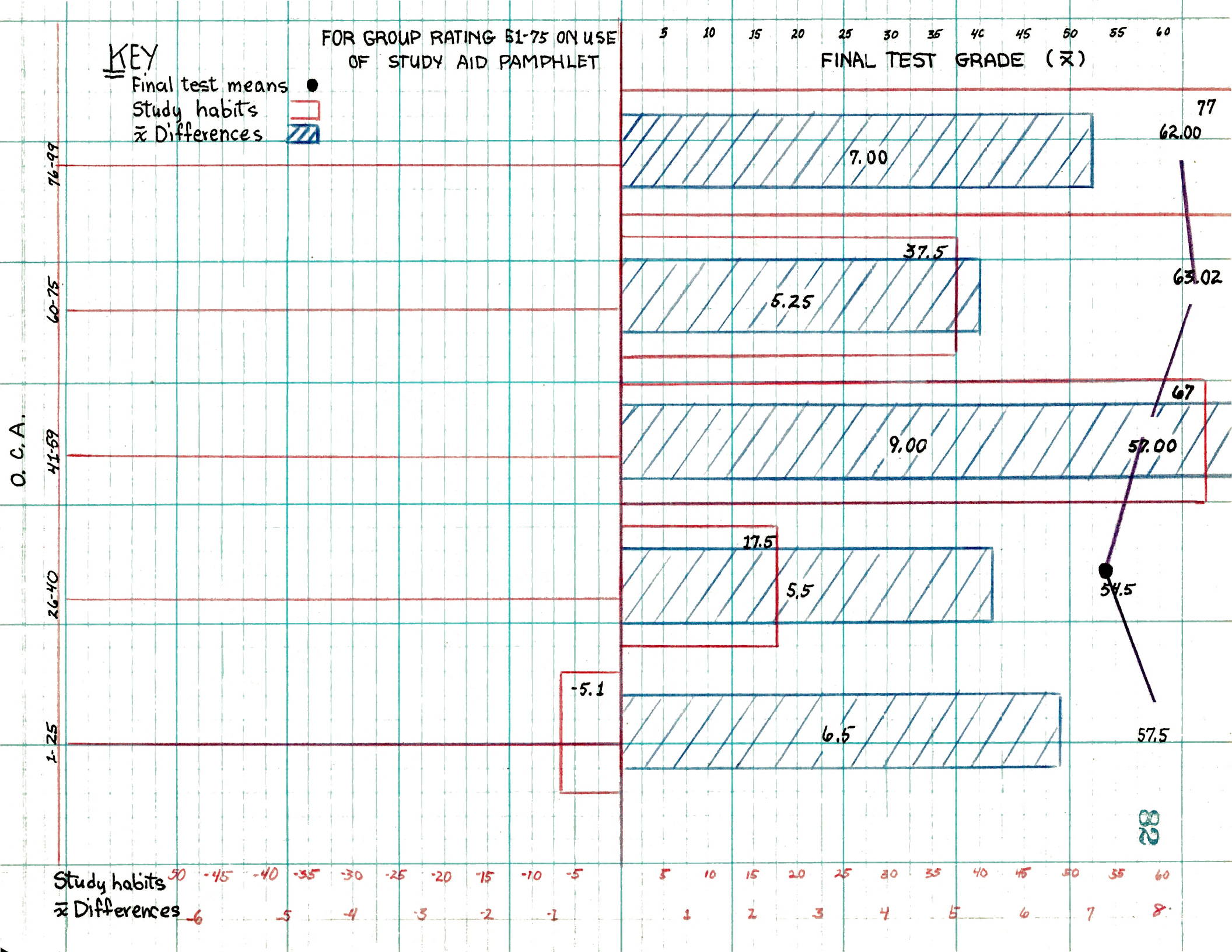
Recommendations

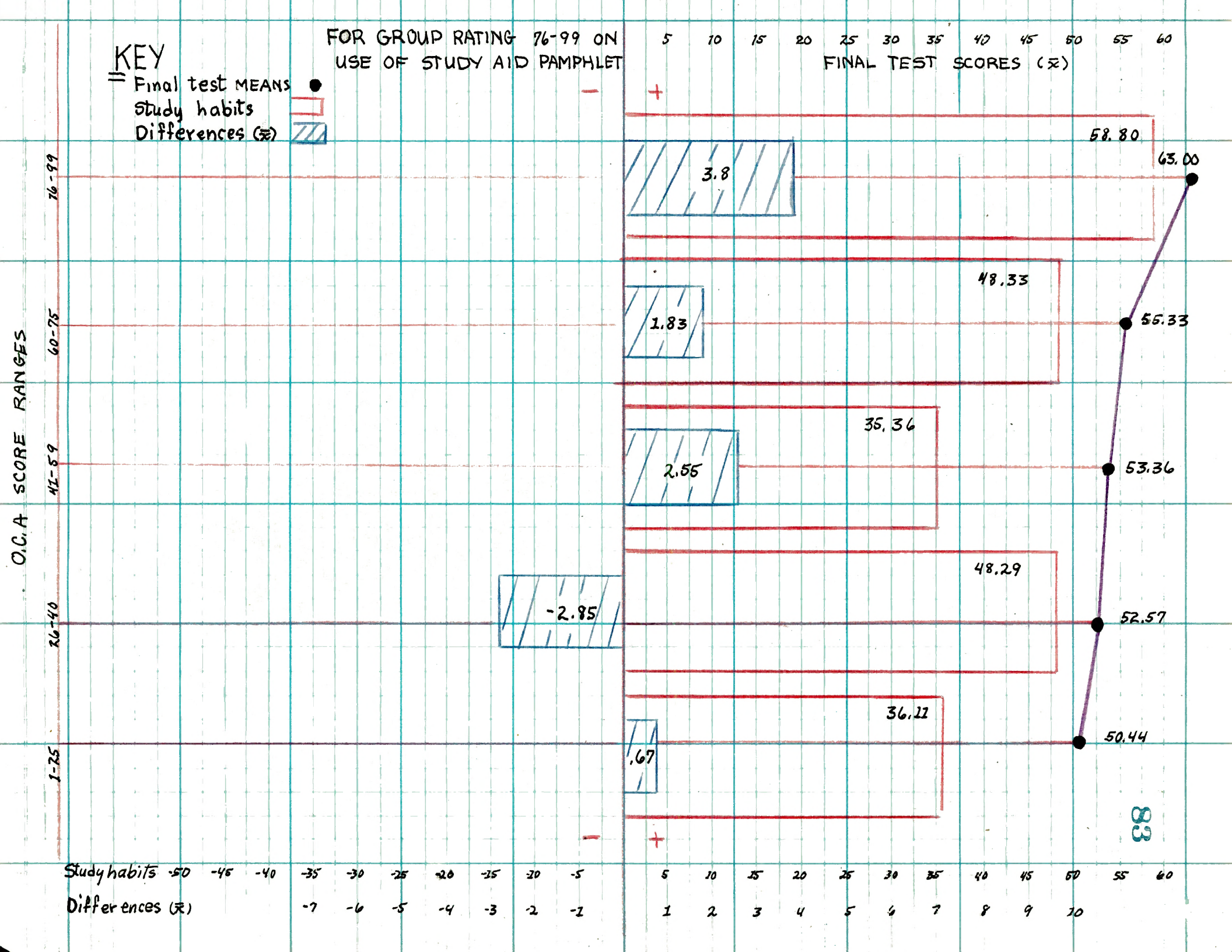
On the basis of the evidence contained in this study, the writer recommends that the "Study Aid Pamphlet", should be employed in other college level classes without allowing the class to become aware of the fact that its use was experimental.

The writer believes that in future research on this subject, tests that are very highly standardized might provide even more highly significant results than were obtained in this study. The use of standardized tests would also allow the experimenter to involve two separate classes in the research problem. Thus, neither class would have to be aware that the other was being pitted against it.

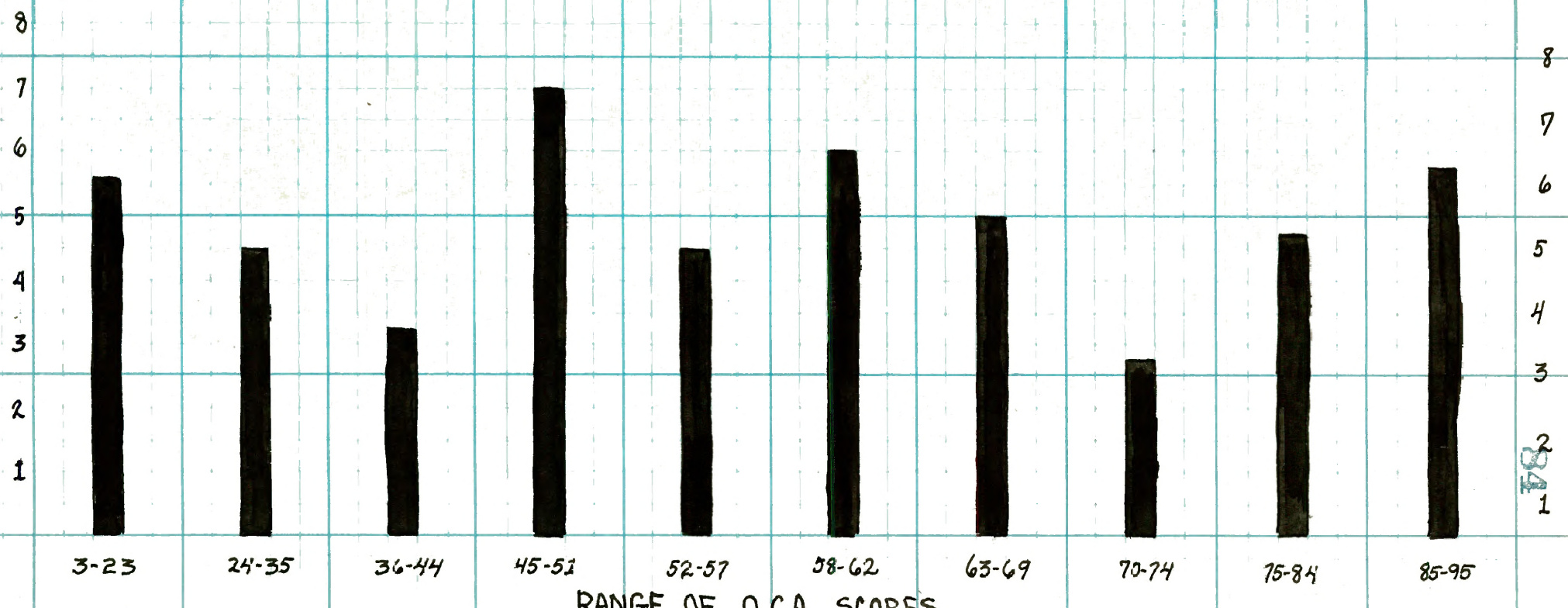

KEY
= Final test MEANS
Study Habits
Differences
FOR GROUP RATING 1-25 ON USE OF STUDY AID PAMPHLET
FINAL TEST SCORES (X)
5 10 15 20 25 30 35 40 45 50 55 60
O.C.A SCORE RANGES
76-99
60-75
41-59
26-40
1-25
-3
0
-7.3
1.3
-4
-8
-52
-9
59
58.6
40
44
StudyH -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5
Differences -10 -9 -8 -7 -6 -5 -4 -3 -2 -2
5 10 15 20 25 30 35 40 45 50 55 60
1 2 3 4 5 6 7 8 9 10
08


KEY
Final test MEANS
Study habits
Differences
FOR GROUP RATING 26-50 ON USE OF STUDY AID PAMPHLET
FINAL TEST SCORES (x̄)
5 10 15 20 25 30 35 40 45 50 55 60
O.C.A. SCORE RANGES
76-99
60-75
41-59
26-40
1-25
65.25
57.00
54.50
53.42
53.5
.75
1.62
2.28
5.6
27.75
20.7
47
Study H. -60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5
Differences (x̄) -8 -7 -6 -5 -4 -3 -2 -1
5 10 15 20 25 30 35 40 45 50 55 60
1 2 3 4 5 6 7 8 9 10


KEY
Final test means
Study habits
x̄ Differences
FOR GROUP RATING 51-75 ON USE OF STUDY AID PAMPHLET
5 10 15 20 25 30 35 40 45 50 55 60
FINAL TEST GRADE (x̄)
O. C. A.
76-99
60-75
41-69
26-40
1-25
77
62.00
7.00
37.5
5.25
63.02
67
9.00
59.00
17.5
5.5
54.5
-5.1
6.5
57.5
82
Study habits -50 -45 -40 -35 -30 -25 -20 -15 -10 -5
x̄ Differences -6 -5 -4 -3 -2 -1
5 10 15 20 25 30 35 40 45 50 55 60
1 2 3 4 5 6 7 8


KEY
Final test MEANS
Study habits
Differences (x̄)
FOR GROUP RATING 76-99 ON USE OF STUDY AID PAMPHLET
FINAL TEST SCORES (x̄)
5 10 15 20 25 30 35 40 45 50 55 60
O.C.A SCORE RANGES
76-99
60-75
41-59
26-40
1-25
58.80
63.00
3.8
48.33
55.33
1.83
35.36
53.36
2.55
48.29
52.57
-2.85
36.11
50.44
.67
Study habits -50 -45 -40 -35 -30 -25 -20 -15 -10 -5
Differences (x̄) -7 -6 -5 -4 -3 -2 -1
1 2 3 4 5 6 7 8 9 10

# AVERAGE GAIN IN TEST POINTS OF EXPERIMENTAL GROUP



# APPENDIX

TABLE 21: Study Aid Pamphlet

STUDY AID PAMPHLET

I. This pamphlet comprises a group of study aids for you. If used according to the instructions there is no doubt that they will be of benefit to you in better grades and more efficiency in your studies.

Like a military campaign, an effective learning program is to a large extent a matter of tactics. Given the same men and material, one general might gain a given objective with minimum losses where another general would fail, simply because the first was a good tactician.

Your position in planning your life program of learning is very much like that of a general planning a military campaign. The same idea applies to your work-a-day world. Oftentimes the difference between a good student and a poor student, a good worker and a poor worker, is not so much a matter of inborn difference in ability to learn or to work as it is a difference in management of those abilities. You have a certain inborn ability to learn and work. That ability is fixed by heredity and there is nothing you can do about it except to plan its effective use.

You can learn how to learn, you can learn how to work. Study skills, and work skills embody certain fundamental principles. The most important of these is a planned, purposeful approach to your assignments.

You must find your own study and work difficulties by an appraisal of your habits. In order to improve these habits you must first of all know what they are.

Listed on page 8 are thirty study habit questions. Read these questions and answer each one yes or no as honestly as you can. Remember this is a self-inventory, you are appraising yourself. Taken seriously this inventory can help you eliminate some of your serious faults. Answers to questions on this inventory will differentiate the efficient habits from the inefficient habits among learners and workers and furnish foundation for self-improvement.

---

At this time accomplish the Student Habit Inventory attached to these sheets. After this has been done, check your answers against the key attached to page 20.

---

After you have completed the questionnaire and scored it with the key you can analyze your weak areas indicated according to the questions you have missed.

To improve in learning habits or in work habits the analysis of the weak areas must be thorough. Remember a good tactician uses all the means available to him to the best advantage.

To further aid you in your analysis there are listed below plans you can follow in your study or analysis of yourself.

The demands made by the modern school or by the modern job are greated today than ever before. Competition is keener and the situations to be faced more complex. It is therefore essential that you spend your study time or your time on the job as efficiently as possible. Your difficulties may be similar to those listed below, or may be individual ones. Whatever they are, the following guides and questionnaire will, if applied, give you more understanding and retention for the hours you spend.

LIST OF STUDY PROCEDURES

II. 1. As soon as possible, get an overall survey of the course. In other words, get an idea, a definition of the course.

2. Read each assignment before you attend the lecture or quiz session.

3. Read each unit with this question in mind: "What is the main point of this discussion."

4. Do not take notes that are too detailed, either in class lectures or in reading.

5. Recite as much as possible.

6. As far as possible, tie in with your past experiences everything you read and hear.

7. Follow a study schedule as close as possible.

8. Introduce rest periods within reason.

9. Whenever possible, do important studying before sleep or recreation.

10. Overlearning pays off in better grades.

11. When reading an assignment, working in the laboratory, know what you are looking for.

12. Do not answer questions blindly--Read it and then attempt to organize your thinking.

III. Fill out the schedule attached on page 11 for next week. Follow it conscientiously. This is a means of marshalling your time so that you have enough of it to do everything you want to. Make this practice a habit--Make a schedule for each succeeding week.

DETAILED PLAN

1. Planning: Of a group of students picked for their good study habits, half listed "planning their study and organizing their material and assignments prior to study" as a helpful technique. Not one of a group picked for poor study habits listed the technique. Suggested ways for you to plan are:
   1. Keeping your notebooks in order; placing on your desk only what you need for the assignment you are studying.
   2. Forming the habit of scheduling a specific time for study.
   3. Trying to start planning or organizing several hours or even a day before the actual studying is to take place.
   4. Determining the purpose and goals of work before you begin.

2. Study Conditions: Poor study groups mentioned noise and distraction as interfering with study much more frequently than did the good study groups. This suggests that those with poor study habits are readily distracted. Nevertheless, distracting influences are attention stealers for all students. The individual who has learned to concentrate in spite of extraneous noise will, if that distraction is great, be near exhaustion at the end of 3 hours of study. The individual who cannot shut out distraction will spend many hours, where a few efficient ones would do.

Part of the solution is to provide for yourself adequate conditions under which to study and adequate facilities for your night's work. A poorly placed desk, inadequate lighting, and badly arranged study materials can detract from your efficiency almost as much as noise can.

An analysis of your study facilities should be made, and the following rules applied:

(1) Situate your desk so that you are not facing a window or an open doorway. The front should be close to a blank wall if possible.

(2) Desk lighting should be adequate, evenly diffused, and so arranged that there is a minimum of glare.

(3) Make an agreement with your family about the radio. It should not be in the room in which you study.

(4) Have study materials close at hand so that you avoid breaking continuity of study by going after them.

(5) Study in an erect position, or with elbows on the desk. Do not read while reclining.

(6) Have adequate ventilation, and in cold weather avoid overheating.

(7) Make an agreement with other people in adjoining apartments about loud radios, and other unnecessary noise.

(8) Develop the attitude that this work, if studied efficiently will not only be stimulating, but also will reduce amount of study time necessary to complete assignments and allow needed recreation and leisure time.

(9) Get enough physical exercise to keep fit.

(10) Try to solve personal problems before the study begins.

(11) No set of rules can substitute for the will power necessary for developing the habit of concentration. Only by a resolution to make your study period one of complete can you block out external distractions, and more important, prevent wandering thoughts and day-dreams.

3. <u>Reading for Meaning:</u> Reading must be an active process! Learning and interest depend on the mental alertness of the student. If you know yourself to be a slow reader, or have other reading difficulties, basic exercises for the improvement of reading skills will be furnished you on request to appropriate advisers.

Surveying. Before you begin reading an assignment, make a survey of chapter headings and topic headings. This will give you a whole view of the material and will assist in maintaining continuity. You will see where the parts fit into the unit. This survey may be made immediately before study; however some students find it more valuable if made several hours before the study period.

Self-Interrogation. You can best make reading active by mentally rephrasing the chapter titles and topic headings as questions. If you practice this, it will soon become an unconscious habit which will set your mind to receive and remember the essence of the material at hand. If you have this mental set, reading will give the answers to the questions you have posed to yourself. Spend no more time than is necessary to answer the meaning of the topic heading questions. Do not attempt to memorize either the advance sheets or sections in manuals.

Practice: After you have read the material can you look away from the book and answer the key questions which the topic headings have asked? Try it. If you cannot, take a sheet of paper or a file card and, as you read, jot down the topic headings and a brief cue phrase for each.

4. Memory Aids: Underlining and marginal notes: Underlining and making marginal notes may be of value if not overdone, and if done with a definite purpose. Never let them become devices for procrastination. Either, accomplished with the thought "I'll look it up some day when I have time", are wasted effort. As an aid to making reading an active process by pointing to important keys to understanding, they are good. It is often sound practice to include in your files the page numbers and brief titles of material you have underlined or marked by marginal notes.
Outlining: After the material has been read, your objective is to retain this material as long as possible--if you do not remember it, at least you will have it organized so that further reference to it is facilitated.

You may have notes, underlinings, marginal notations, and file references as a result of your reading work. These should be organized into a readable, reviewable, comprehensive outline. Make the outline as brief as possible in doing this job.
Unification: To make these materials a part of your usable knowledge, try to think of an example from your experience which fits the reading selection. Try to picture the use of this material in future situatinns. Also, associate newly learned material with other parts of the course. This can be done by referring to the notes, advance sheets, and answers to other problems. Discussion with other students or instructors not only will aid the fixing of material but also will add their experience to your own. All these activities will help you to see each assignment as a real problem and as part of the entire course.
Review: Each lesson of a night's assignment should be reviewed as a whole unit. Look over your notes and outline. This review should be made the same night as the study and again when the subject studied is reintroduced in the course.

IV. <u>Practice in Vocabulary Building:</u>
Do:

(1) Make a list of all words you have to look up in your reading, noting first the primary meaning and then the special military meaning.

(2) Review this list from time to time, and think up a few sentences or phrases in which each word is used.

(3) Extend your list by thinking of words related to those on your list; try to think of ordinary synonyms and antonyms (single words having similar or opposite meaning) for each and use them in sentences. The dictionary sometimes lists synonyms and antonyms at the end of an entry.

(4) Extend your list by testing yourself on sample passages from your assignments which you understand reasonably well.

(5) Try to use words from your list in speaking and writing, whenever you can do so naturally.

Do Not:

(1) Do not pick words from the dictionary at random, there are about 600,000 words in the language, and your chances of finding a useful word that way are slight.

(2) Do not try to memorize lists of words.

(3) Do not (except in the case of technical terms with very specific meanings) try to memorize definitions.

(4) Do not try to repair your vocabulary too rapidly; a few words added to your list each night will be as much as you can handle.

V. Summary: Study skills, though individualized, embody certain fundamental principles. The most important of these is a planned, purposeful approach to your assignments.

You must find your own difficulties by an appraisal of your habits. If you wish to improve them, remember and apply these techniques:

(1) Survey the material.

(2) Use self-interrogation by posing topic heading as questions and read with the specific purpose of finding the answers.

(3) Practice reciting the answers which you have found.

(4) Use memory devices such as underlining, marginal notes, and outlines. If these are not helpful to you, develop similar skills of your own.

(5) Unify and evaluate material read.

(6) Review each assignment.

(7) Remember this process is an appraisal of your strength and weaknesses. Note your strengths and use them to advantage, also note your weaknesses.

# STUDENT-HABIT INVENTORY

| | | | |
|---|---|---|---|
| Yes | No | 1. | Do you sometimes study with the radio going or with other persons talking in the same room? |
| Yes | No | 2. | Do you read and study by indirect(diffused) light? |
| Yes | No | 3. | Do you read under a colored light? |
| Yes | No | 4. | Do you try to study with others whenever possible rather than alone? |
| Yes | No | 5. | Do you usually have to smoke while you study? |
| Yes | No | 6. | Have you had your eyes tested by a good oculist or optometrist within the past two years? |
| Yes | No | 7. | Do you read so slowly that you have trouble covering all your assignments. |
| Yes | No | 8. | Do you move your lips or mumble while studying hard passages? |
| Yes | No | 9. | Do you have a tendency to day-dream when you should be studying? |
| Yes | No | 10. | Do you have to wait for a mood to strike you before attempting to study? |
| Yes | No | 11. | Does every little noise disturb your train of thought while studying? |
| Yes | No | 12 | Do you sometimes discover that you have turned several pages in your textbook but that your "mind is blank" for what was said on them? |
| Yes | No | 13. | Do activities often interfere with your study periods? |
| Yes | No | 14. | Do you often wish that you could drop out of school and get a job? |
| Yes | No | 15. | Do you sometimes make simple charts or diagrams to represent points in your reading? |
| Yes | No | 16. | When you find a new word in your reading, do you usually look it up in the dictionary? |
| Yes | No | 17. | Do you usually skim over a reading assignment before studying it in detail? |
| Yes | No | 18. | Do you keep your class notes and reading notes for each subject together? |
| Yes | No | 19. | Do you often take notes in class just as fast as you can write? |
| Yes | No | 20. | Do you generally take your notes on reading assignments in outline form? |
| Yes | No | 21. | In studying for a quiz or examination do you try to memorize the exact words of the textbook? |
| Yes | No | 22. | Do you try to use the facts learned in one subject to help you understand anothersubject. |
| Yes | No | 23. | Do you sometimes sit down to study at home and discover that you do not have the exact assignment clearly in mind? |
| Yes | No | 24. | Do you frequently try to analyze your work to find out where you are weak? |
| Yes | No | 25. | Do you hesitate to ask your instructor to explain points that are not clear to you? |
| Yes | No | 26. | Do you have trouble picking out the important points in a study assignment? |

Yes No 27. Do you mark important or difficult passages in your textbooks as you study so that these points can receive special attention when you review?

Yes No 28. Do you study a subject with the idea of remembering it only until the course is over?

Yes No 29. When studying do you stop every now and then to force yourself to recall what you have just read?

Yes No 30. Do you study late into the night or even all night before an important examination?

KEY TO QUESTIONNAIRE

The well organized student answers the questions as follows:

(1) No; (2) Yes; (3) No; (4) No; (5) No; (6) Yes;
(7) No; (8) No; (9) No; (10) No; (11) No; (12) No;
(13) No; (14) No; (15) Yes; (16) Yes; (17) Yes; (18) Yes;
(19) No; (20) Yes; (21) No; (22) Yes (23) No; (24) Yes;
(25) No; (26) No; (27) Yes; (28) No; (29) Yes; (30) No;

| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|---|
| 7:30 | | | | | | | |
| 8:00 | | | | | | | |
| 9:00 | | | | | | | |
| 10:00 | | | | | | | |
| 11:00 | | | | | | | |
| 12:00 | | | | | | | |
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| 8:30 | | | | | | | |
| 9:00 | | | | | | | |
| 9:30 | | | | | | | |
| 10:00 | | | | | | | |
| 10:30 | | | | | | | |
| 11:00 | | | | | | | |

Enter classes in red pencil.

Name. . . . . Week beginning. . . . . .

Table No. 24.

MEANING OF CENTILE RANK IN TERMS OF ACADEMIC ACCOMPLISHMENT OF THE OHIO COLLEGE ASSOCIATION TEST

| Centile Rank of a Pupil (High-School Senior Norms) | Minimal Number of Hours Which Such A Student Should study Each Week | Academic Accomplishment |
|---|---|---|
| 1 | (55) | Almost certain to fail in college. |
| 10 | (42) | Only about one in ten will graduate. |
| 20 | (35) | Should generally go to college only when ambition and perseverance are unusual; will make low to barely passing marks. |
| 30 | 30 | Will make low C on the average; not sufficient as a minimum to continue in college after the first year. |
| 40 | 29 | Success fair in the easier curricula. |
| 50 | 28 | The average student in intelligence; about one in three or four will graduate. |
| 60 | 27 | Slightly better than average marks in college. |
| 70 | 26 | High C grades in college. Students of this intelligence level often go in for athletics and extra-curricular activities to such an extent that their marks suffer. |
| 80 | 25 | Should average B marks. |
| 90 | 23 | Phi Beta Kappa average. Will do superior work in college if motivated. Should pick instructors capable of arousing creative possibilities. |

MEANING OF CENTILE RANK IN TERMS OF ACADEMIC ACCOMPLISHMENT

OF THE OHIO COLLEGE ASSOCIATION TEST

| Centile Rank of a Pupil (High-School Senior Norms) | Minimal Number of Hours Which Such a Student Should Study Each Week | Academic Accomplishment |
|---|---|---|
| 100 | 20 | Capable of genius; unusual leadership and creative possibilities. Belongs to the 300 brightest of Ohio's 30,000. Such pupils have seldom had to work hard in high school and often do unusual college work or get disgusted and drop out with one or two years of college. |

Table 22

First Psychology Examination

True-False Questions
Use answer sheets. If statement is true, make a vertical make in space number one opposite appropriate number. If it is false place a similar mark in space number two.

1. Emotional reactions can be unconscious.
2. The emotion of gloom may have a positive effect upon the functioning of an individual.
3. Painful physical symptoms may result from emotional conditions alone.
4. The emotions may serve as motivating conditions.
5. Emotions may give direction to outer activity.
6. In sustaining motivation, emotions depend upon the continuance of conscious mental processes.
7. Emotions are more complex than physical drives.
8. Strong emotion has no effect upon ability to reason.
9. Worry is an anger reaction.
10. In studies cited, fear was found to be more often a reaction to persons than to things.
11. Emotional excitement may be injurious to the health of the individual.
12. Extended periods of emotion are called moods.
13. It is possible for the contractions of the stomach to cause hemmorhages.
14. The eyes tend to be the most emotionally expressive part of the face.
15. Superior adults can accurately determine the cause of a baby's cry by its sound alone.
16. The increase in voice intensity during anger is innate.
17. Psychologists are convinced that the lie detector results are reasonably reliable evidence.
18. Anger responses in emergencies are innate reactions.
19. Voluntary attention over a period of time results in boredom.
20. Habitual attention is a form of involuntary attention.
21. Accuracy of observation may be improved by informing the observer what to look for.
22. The same effective process may occur in different emotions.
23. Any disturbance of visceral processes produces experience.
24. The only emotion clearly present in all infants is excitement.
25. Judges of emotional reactions in babies exhibited the greatest agreement when they saw the stimulating situation.
26. Infants aged six months exhibit about a dozen distinguishable emotions.
27. Crying, smiling, and laughing are learned aspects of emotional behavior.
28. Fear of particular situations like darkness, is learned.
29. Comparison of Chinese and European emotional expressions illustrates the essential similarity of emotional behavior in different cultures.
30. The frequency of emotional upset becomes greater as the child grows.

31. It is customary for the subject of an experiment on emotion to describe his emotional experience while having it.
32. Both fear and joy were reported as exciting by over 50 per cent of the subjects.
33. The bodily process of which soldiers entering battle were most frequently aware was dryness of the mouth.
34. Variation in the overt expression of fear from one person to another is more evident than stereotypy in expression.
35. Facial expressions aroused in the laboratory by an emotion-provoking stimulus were similar from one subject to another.
36. Subjects who said that they experienced the same emotion differed greatly in emotional expression.
37. Some emotions most typically involve avoidance reactions while others most typically involve approach reactions.
38. One important result of excess adrenin is raised blood sugar.
39. From a record of physiological changes in emotion, an expert is able to discern what emotion was present.
40. Animals deprived of the hypothalamus show little resulting change in emotional expression.
41. Recent research suggests that the cerebral cortex plays an important role in emotional behavior.
42. According to the thalamic theory, emtional experience may occur without dependence upon visceral and skeletal reactions.
43. The James-Lange theory streasses the dependence of emotional experience upon impulses from the visceral and skeletal structures.
44. Stimulation of the hypothalamus by artifical means arouses emotional behavior that is indistinguishable from the behavior aroused in situations which normally evoke emotion.
45. The development of fears in children is dependent on intellectual as well as emotional growth.
46. As the child matures and learns to distinguish the significance of different stimuli, intense emotional responses becomes more frequent.
47. Experimental extinction of a conditional response means that spontaneous recovery does not occur.
48. A conditioned fear cannot be eliminated unless the origninal fear-conditioning situation or object is known.
49. Any fear response to an object not biologically adequate to produce fear can be changed by learning.
50. The child's demand for love and approval should be discouraged in order to foster the true independence which is required of the citizen in a democracy.
51. The spoiled child has usually received inconsistent rather than excessive amounts of attention and affection.
52. Emotional difficulties tend to be passed on from parent to child.
53. Clinical psychologists have found that the reason some mothers over-indulge their children is that they love them more than most mothers do and cannot bear to see them frustrated and unhappy.

Multiple Choice

Mark the correct number for the answer in the appropriate space on the answer sheet.

54. In infants the emotion of fear 1. is produced by any strong stimulus, 2. appears at about the third month, 3. does not appear as a reaction to a stimulus without previous conditioning to that stimulus, 4. appears before the emotion of distress.

55. The emotion of shame 1. appears at around the eighteenth month, 2. is one of the very few inborn reactions, 3. is largely learned from the social environment, 4. seems to bear no relation to fear.

56. The best method of changing conditioned fears is 1.disuse, 2. frequent application of the stimulus, 3. reconditioning, 4. social imitation.

57. Clinical psychologists believe that most emotional difficulties 1. are abnormal, 2. originate in childhood experiences, 3. are probably the result of innate constitutional factors, 4. cannot be explained by general principles of emotional development.

58. Studies have shown that infantile fingersucking 1.results from a biological need, 2. is a derived motive, 3. will continue into later childhood unless discouraged, 4. tends to deform the dental arches and cause crooked teeth in later childhood and adulthood.

59. Perception includes: 1. judgments of time, 2. organizing the sensory elements into a pattern, 3. both of these, 4. neither of these.

60. Emotions differ from physiological drives in that they 1. do not serve as motivation; 2. are less complex; 3. involve a realization of the significance of situation; 4. cannot arouse, sustain, and direct activity.

61. The external response which goes with anger is usually 1. approach; 2. retreat; 3. destruction; 4. grief.

62. In classifying external responses we include 1.retreat; 2. stopping of response; 3. both of these; 4. neither of these.

63. In violent emotion 1. adrenin in secreted into the blood stream; 2. the pupil of the eye contracts; 3. the air passages into the lungs contract 4. all of these.

64. Strong emotion lowers a person's capacity for 1. withstanding pain; 2. complex performance; 3. maintaining action for long periods; 4. using his maximum strength.

65. The quarter of the year in which the low point for moods falls is the 1. first; 2. second; 3. third; 4. fourth.

66. As a cause of uncomplicated peptic ulcers, emotional upset is; 1. absent; 2. present to a degree; 3. predominant; 4. conducive to recovery.

67. Facial expression of emotion can be more accurately interpreted in; 1. adults; 2. children; 3. babies; 4. equal accuracy in any of the three.

68. The emotion most easily identified in photographs of the is; 1. contempt; 2. surprise; 3. anger, 4. happiness.

69. The inspiration-expiration ratio drops in response to; 1. disgusting situations, 2. crude sexual emotions; 3. fear-provoking situations; 4. all of these.

70. Consciousness of guilt calls forth the reaction of: 1. fear; 2. anger; 3. annoyance; 4. all of these.

71. To control emotions an attempt should be made to; 1. change the situation; 2. reinterpret the situation; 3. accept the emotion; 4. do all of these.

True-False Questions

Follow same directions as page 1.

72. Bright colors heighten the apparent size of an objects.
73. Some internal determiners of attention are psychological drives.
74. Distraction of persons attending increases muscle tension.
75. Intelligent men have relatively few prejudices.
76. Emotional habits are innate.
77. In the James-Lange theory of emotion, the mental state preceeds physiological change.
78. Moving objects look larger.
79. Emotional expressions are actually a mixture of innate, culturally acquired, and individual or personal elements.
80. Muscle tension in the process of attention is due to distracting forces in the environment.

Table 23.

Final Psychology Examination

True-False questions: If the answer is true place a mark in the first space on your answer sheet; if the answer is false, mark the second space.

1. Our simplest learned activities are conditioned responses.
2. The unconditioned stimulus for sucking is the sight of the bottle.
3. Conditioning has been obtained in animals deprived of the cerebral cortex.
4. The time interval which produces the quickest association between conditioned and unconditioned stimuli is about three seconds.
5. Conditioning is possible only when the response to be conditioned can be made voluntarily.
6. As conditioning proceeds, the conditioned response becomes less generalized.
7. Feebleminded adults are more readily conditioned by laboratory conditioning techniques than are normal adults.
8. The chief function of conditioning procedure in curing enuresis in its lowering of the threshold of waking in response to bladder tension.
9. Higher-order conditioning is more evident in dogs than in human beings.
10. Conditioned responses are experimentally extinguished by associating them with a pleasant stimulus, like candy.
11. Experimentally extinguished conditioned responses sometimes reappear.
12. School children condition faster than preschool children.
13. In some instances of conditioning the conditioned response is the same as the unconditioned response.
14. We cannot condition a response unless it is already exhibited by the organism.
15. Animals do not learn unless they are hungry.
16. Man is the only organism that learn by imitating.
17. Insight is more evident in problem-box situations than in situations involving an alley maze.
18. For the scientific study of learning, acquisition of some practical skill (like shooting a target) is more valuable than acquisition of such a skill as tracing through a maze.
19. Both animals and men exhibit trial-and-error reactions in solving problems.
20. Observational learning is more evident in man than in other organisms.
21. Practice and training, as used in this chapter, mean the same thing.
22. Learning to speak illustrates acquisition of a verbal skill that is also motor.
23. In development of a habit-hierarchy, one learns the simplest habits thoroughly, then consciously ties these units into patterns of greater complexity.
24. Awareness of what one is doing tends to decrease as skill develops.
25. Learning curves show the rate at which performance changes as a function of successive units of practice or training.
26. Cross-education is what produces mental discipline.

27. In an experiment on transfer, the control group does everything that the experimental group does except take the final test.
28. When we are called upon to make an old response to a new situation, transfer if it occurs, is most likely to be negative.
29. All that is necessary to produce learning is the motive to learn.
30. The forms of motivation to learning which are most effective for animals are also most effective for men.
31. Hungry-non-rewarded rats and non-hungry rats given food show similar progress in maze learning.
32. After rats have run the maze a number of trials without reward, introduction of reward leads to rapid decline in time and error curves.
33. Once a rat has shown progress in maze learning, removal of the reward fails to hinder further learning.
34. In maze learning by children, a material reward given at each trial, regardless of performance, is less effective than a material reward given only after perfect trials.
35. In experiments on punishment and reward in learning, punishing errors and at the same time rewarding correct responses has led to the most rapid learning.
36. Electric shock for correct responses is sometimes more effective than no shock.
37. In the experiment on praise versus reproof, both groups showed steady progress, although the praised group showed the greater progress.
38. Motor skills are not acquired unless some knowledge of results is present.
39. We ten to forget incorrect associations faster than we forget correct ones.
40. Motivation is likely to be greater in distributed than in massed practice.
41. When associations are of equal strength, further practice of a specific amount improves the younger more than the older.
42. Research discloses that it is always more efficient to learn by wholes than to learn by parts.
43. Regardless of which procedure we may use throughout the the learning process, it is always better to examine the parts before making an over-all survey.
44. Learning may occur without a reward being present in the situation.
45. Perception is totally dependent upon the unlearned organizing properties of the nervous system.
46. In conditioning experiments the conditioned response may be different from the reflex action which the subject made in the original learning situation.
47. In a conditioning experiment, the subject changes his response to the conditioning stimulus.
48. Most habits are simple connections between the stimulus and rhe response.
49. Reintegrative mechanisms are processes which eradicate a former learning pattern.
50. Learning does not always involve a change in the nervous system.
51. Learning by imitation eliminates the need for trial-and-error activity.
52. In a maze, motivational conditions need not be present to produce active exploratory behavior in the rat.

53. "Mental set" is always an advantageous factor in learning.
54. How well one retains depends upon how the material was originally acquired.
55. Forgetting is usually very rapid at first and then slower with the passage of time.
56. The delaying reaction experiment aims to discover whether an organism can respond to an absent stimulus.
57. Studies show that recitation favors immediate but not permanent retention.
58. In general, recognition is easier than recall.
59. When there is no recall or recognition of a fact, some retention may be shown by the relearning method.
60. The memory span experiment is ordinarily used to test recall rather than recognition.
61. The memory span of a given individual remains constant from trial to trial.
62. The common remark that one remembers faces better than names suggests the superiority of recognition over recall.
63. Slow learners usually have better memories than fast learners.
64. The more meaningful the material studied, the better it is retained.
65. Retroactive in hibition refers to the interference of a new activity with the retention of a previously learned activity.
66. Learning by man differs from learning by animals in being characterized by insight and not by trial-and-error.
67. Most learning curves show a physiological limit.

Multiple Choice: Place the correct number in the right space on the answer sheet.

68. Learning involves a change in 1. the autonomic nervous system; 2. central nervous system; 3. both of these; 4. neither of these.
69. In psychology the term "response" means 1. effector response; 2. internal response; 3. both of these; 4. neither of these.
70. The psychologist may refer to all products of learning as 1. responses; 2. conditioning; 3. habits; 4. innate patterns.
71. Kinesthetic stimulation is especially important in the formation of 1. conditioned responses; 2. emotional habits; 3. motor habits; 4. symbolic habits.
72. In a conditioning situation the subject is learning 1. what to expect from the situation; 2. an effector reaction; 3. both of these; 4. neither of these.
73. An individual's characteristic ways of handling life situations are called 1. domination; 2. conditioning; 3. adjustment techniques; 4. rationalizations.
74. Reintegrative mechanisms operate 1. to produce unconscious meanings; 2. to produce unconscious expectations; 3. to govern behavior; 4. to do all of these.
75. Insight may involve 1. trial and error; 2. perceptual reorganization; 3. both of these; 4. neither of these.
76. Learning is most dependent upon 1. perception of all the situation; 2. perceiving one aspect of the situation as being related to another part of the situation; 3. both of these; 4. neither of these.
77. Problem-solving learning depends upon 1. persistent attack on the problem; 2. strong motivation; 3. both of these; 4. neither of these.

78. An important factor in learning is the accentuation of certain perceptual processes. This may best be accomplished by 1. reward; 2. punishment; 3. both of these; 4. neith er of these.

79. The disadvantage of punishment as a factor in learning is that it 1. prevents recurrence of a response; 2. extinguishes some nervous connections; 3. has unpredictable effects; 4. accentuates perception.

80. Two students get different grades in a Chemistry examination. This: 1. means that there are differences in the amount of learning; 2. means that they have different maturational status; 3. proves that motivation was different; 4. does not necessarily reflect differences in learning.

I, the undersigned, a member of the study habit experimental group, have utilized the Study Habit Pamphlet----(underline one of the following.)

0 25 50 75 100

Little Some Average Much Completely

I understand that this rating will not in any way affect or influence my grade in Psychology 112.

Signature_____