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The application of Latin to the understanding of certain Latin elements in English

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Thesis

THE APPLICATION OF LATIN TO THE UNDERSTANDING OF CERTAIN LATIN ELEMENTS IN ENGLISH

by

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THE APPLICATION OF LATIN TO THE UNDERSTANDING OF CERTAIN LATIN ELEMENTS IN ENGLISH

PART I

STATEMENT OF THE PROBLEM.

This study aims to find out, by means of an objective test given to high school seniors within a limited field, if the study of Latin functions by way of increasing the ability of Latin students to understand the Latin words, phrases, abbreviations and quotations which commonly occur in English, and if so, to what extent. This aim of Latin study, Instrumental and Application objective, #2, namely "Increased ability to understand Latin words, phrases, abbreviations and quotations occurring in English."[1] was one of a tentative list set up by the Classical Investigation Committee at the beginning of their study. After due examination of the three types of objectives, (1) Instrumental and Application, (2) disciplinary, and (3) cultural, the Committee prepared a brief catalogue of aims both immediate and ultimate, which they considered "valid for the secondary course as a whole."[2] For this simplified list the objective quoted above was incorporated along with several other Instrumental and Application Objectives[3] into one item phrased "Increased understanding of those elements in English which are related to Latin,"[2] and it held second place, being the next objective mentioned after #1 "Increased ability

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[1] Report of the Classical Investigation, Part I, p.33.
[2] Ibid. p.78.
[3] Ibid. p.33. #3,6,7,8.

to read and understand Latin," the Primary Immediate Objective of all Latin study.

Thus, it will be seen that this paper is closely concerned with an important hoped-for outcome of Latin study. At a time like the present when Economy is the byword of the day, this study is especially fitting, for it will indicate whether or not this particular objective is being attained in the schools singled out for study. It will direct thought toward the fact that any subject must have worthwhile aims and accomplish those aims or soon expect to be discarded.

In September, 1924 when the Classical Investigation Committee compiled their report, two studies in this connection had been made. Miss Louise V. Walker wrote Latin in Current Periodicals and Newspapers as her Doctor's Dissertation at the University of Wisconsin in 1923. Very carefully she compiled several frequency lists, which work confirms the choice of the objective relating to Latin in English. She says,

"The range and frequency of Latin words, phrases and abbreviations in English periodicals and newspapers is great enough to warrant their consideration as an objective of study in Latin.

A comparison of their content in vocabulary, form and syntax with statistics taken from the texts used in the present course, shows practically nothing in these phrases not already included in the course as we have it."[1]

She further summarizes her work.

"A test based on the most common words, phrases, and abbreviations, when given to high school classes in senior English, revealed a striking unfamiliarity of the average student with the content of the test, especially with the group of phrases.

. . . .

It would seem that such material as is found in the content of the tests should receive special attention early in the course.

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[1] L. V. Walker Latin in Current Periodicals and Newspapers, p.54.

The occurrence of this Latin in widely read English magazines makes an understanding of it desirable for all high school students. If it is not included in some required course, it should at least be studied in the first or second year of the Latin course where most students will be benefitted. The study of phrases more desirable for problem or illustrative material may, if necessary under the pressure of time, be limited to students who continue the course in Latin."[1]

Professor V. A. C. Henmon, Head of the Department of Education at the University of Wisconsin, under whose oversight Miss Walker wrote her dissertation, himself commented on the conditions which their test brought to light.

"Pupils who have studied Latin do very much better, particularly with words and phrases, than those who have had no Latin. This was, of course, to be expected.

. . . .

There is a fairly regular increase in scores with increasing amounts of time given to Latin.

. . . .

However the outstanding fact of importance is not the superiority of the Latin group over the non-Latin group but that the scores for those who have studied Latin for a year or more should be so low. The averages are all too low for high school seniors even if they have had no instruction in Latin. But surely pupils who have studied Latin for four semesters would reasonably be expected to know more than 40 or 50% of these most frequently occurring expressions.

. . . .

To the writer who believes very definitely in the potential value of Latin as an instrument of instruction it has been a shock in scoring the papers to find among Latin pupils such ignorance of the Latin element in English represented by these tests. The results show clearly one spot where improvement in instruction is much needed and, for that matter, can readily be accomplished if specific attention is given. None of the first year books or grammars examined for this investigation give any attention to the matter."[2]

After giving the test with but few changes to some thousand students Professor Henmon's conclusions are but little changed.

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[1] L. V. Walker Latin in Current Periodicals and Newspapers, p.54.
[2] V. A. C. Henmon, Tests of Knowledge of Latin Words, Phrases and Abbreviations, pp.4-5.

"It is again evident that specific drill which is not now provided, is needed if Latin is to function adequately in bringing about a mastery of the Latin element in English."[1]

His parting shot is,

"Emphasis on the relatively disappointing scores of Latin pupils with these expressions, the worth of a knowledge of which no one would question, should not blind us to the fact that those who have studied Latin for even a semester have gained in the mastery of English very greatly. The results, however, show where instruction in both Latin and English is in need of improvement."[2]

Inasmuch as several years have elapsed since these investigations were made and since of necessity they dealt with regions far from New England it was felt that the time was ripe to look into the working out of this objective right here and now and in New England.

If the writer had been able to secure the previously quoted unpublished study of Professor Henmon at the time when plans for this paper were being drafted, testing procedures would probably have been similar, in an attempt to make a direct comparison between the situation of seven years ago and the present. However, this not being the case, the present study should not be regarded as a continuation of that same type of investigation. The test used by this writer is original and in other ways, as will be seen by further reading of the present treatise, it deviates from his model.

Friends of Latin will hope that the Report of the Classical Investigation has bettered conditions,--that pupils will show a much better understanding of Latin elements in English than did their predecessors of some seven years ago. But enough for hopes--let the facts tell their story.

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[1] V. A. C. Henmon, _Tests of Knowledge of Latin Words, Phrases and Abbreviations_, p.7.
[2] _Ibid._ p.12.

PART II

TESTING PROCEDURES

As a basis of determining pupils' understanding of the Latin element in English an objective test was prepared. It consists of 50 words and phrases and 20 abbreviations. A copy, Table I, follows this page.

In assembling the component parts various groups of Latin words, phrases, etc. were studied. One such simplified list is usually found in the first-year Latin textbooks which have appeared since the publication of the General Report of the Classical Investigation and dictionaries boast of complete lists.

Since the writer's judgment as to frequency of occurrence and importance was not considered wholly reliable, after the items were tentatively selected, deference was paid to Louise Walker's work by consulting her Frequency Lists[1] and omitting some words and phrases not therein contained. In a few cases the writer made some new inclusions. Little attempt was made to rule out items that some authorities might regard as definitely Anglicised because there is such difference of opinion on this point. Table II, Page 7, shows the frequency of occurrence as given by the Walker Frequency Lists. If phrases as such were not given, the frequency of the words making them up is noted. For example pater noster were not noted together but pater alone was noted once and noster alone twice. Therefore in the table #3 is noted as 1-2. While it would have been worth while to prepare separate lists of words and phrases, there had to be limitations due to the relatively short time to be devoted to the study.

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[1] L. V. Walker, Latin in Current Periodicals and Newspapers, pp.13-25.

TABLE I

WRITER'S TEST.

TESTS ON WORDS AND PHRASES

Directions. Several Latin words and phrases appear below. Beside them write their meaning. Even if you cannot think of an exact translation but you do understand the idea, write that.

1. Mens sana in corpore sano
2. Ante bellum
3. Pater noster
4. Adeste fideles
5. E pluribus unum
6. Dramatis personae
7. Ex tempore
8. Exit
9. Requiescat in pace
10. Post mortem
11. Habeas corpus
12. Nolo contendere
13. Labor omnia vincit
14. Corpus Christi
15. Multum in parvo
16. Non ministrari sed ministrare
17. Via
18. Terra firma
19. Tempus fugit
20. Per annum
21. In toto
22. Non compos mentis
23. Per capita
24. Bona fide
25. Ad infinitum
26. Per diem
27. Finis coronat opus
28. Versus
29. Per centum
30. Ad valorem
31. Sub rosa
32. Subpoena
33. Ad nauseam
34. Alma Mater
35. Vox populi, vox Dei
36. Ex post facto
37. Facsimile
38. Prima facio
39. In absentia
40. Mandamus
41. Virginibus puerisque
42. Esto perpetua
43. Ex officio
44. Sic Semper tyrannis
45. Et tu, Brute
46. Veni, vidi, vici
47. Pro bono publico
48. Dei gratia
49. In hoc signo vinces
50. Morituri, te salutamus

TEST ON ABBREVIATIONS

Directions. Several abbreviations from Latin words appear below.
1. Write out the Latin words from which the abbreviations were taken,
2. Also write the meaning of the abbreviation.

1. A.M.
2. Etc.
3. vs.
4. i.e.
5. N.B.
6. Aet.
7. A.D.
8. con (of "pro and con")
9. P.S.
10. R.
11. P.M.
12. cf.
13. e.g.
14. A.B.
15. ss.
16. Pro. tem.
17. circ.
18. Q.E.D.
19. Nol. pros.
20. Ibid.

If you have studied Latin, please state how many years or half years____________________

TABLE II

THE FREQUENCY OF OCCURRENCE OF ITEMS IN WRITER'S TEST AS REPRESENTED BY THE WALKER FREQUENCY LISTS.

WORDS AND PHRASES

Item Number	Occurrence by Walker List
1	1
2	12
3	1-2
4	5
5	6
6	9
7	3
8	Not included since considered Anglicised word.
9	4-17
10	24
11	48
12	1
13	3
14	4
15	1-2
16	Not included
17	Considered Anglicised Latin
18	3
19	1
20	59
21	88-17
22	Not included
23	115
24	60
25	16
26	7
27	10-0-2
28	59
29	3
30	17
31	6
32	Not included
33	5
34	26
35	6
36	7
37	Considered Anglicised Latin.
38	18
39	3
40	Not included
41	1
42	1
43	11
44	2
45	40-28-0
46	2
47	3
48	23-1
49	88-8-1-0
50	1

ABBREVIATIONS

Item Number	Occurrence by Walker List
1	310
2	1185
3	Not noted
4	95
5	1
6	1
7	3
8	Not noted
9	23
10	Not included
11	3030
12	Not noted
13	13
14	343
15	Not included
16	5
17	Not included
18	"
19	"
20	12

The superintendents of representative school systems cooperated in the study so that the test was given to seniors of high schools, large and small, through the English classes. Table III, Page 9, shows that a random sampling was obtained. Table IV, Page 9, indicates the relative size of the schools by the number of papers submitted. Some very large and very small high schools are found but most are within these extremes.

Since the pupils themselves told how long they had studied Latin, the writer could group the papers into classes as desired. This was done using the semester as the unit.

TABLE III

ALPHABETICAL LIST OF SCHOOLS COOPERATING

School	State
Avon High School	Massachusetts
Claremont High School	New Hampshire
Dorchester High School for Boys[1]	Massachusetts
Hanover High School	New Hampshire
Henniker " "	" "
Hinsdale " "	" "
Hopkinton " "	" "
Keene " "	" "
Littleton " "	" "
Northfield High School	Massachusetts
Quincy " "	"
Somersworth " "	New Hampshire
Springfield " "	Vermont
Walpole " "	New Hampshire
Wellesley " "	Massachusetts
Winchester " "	New Hampshire

In these schools the seniors of only the General and College Preparatory curricula were tested, this by request of the principals. Both have very large enrollments.

TABLE IV

RELATIVE SIZE OF THE SCHOOLS

School	Number of papers submitted
A	272
B	162
C	102
D	88
E	85
F	64
G	45
H	39
I	38
J	26
K	24
L	23
M	23
N	21
O	21
P	17
Total	1050

PART III

INFORMATION OBTAINED AND INTERPRETATION OF DATA

The division of the test dealing with abbreviations called for both the original Latin and the meaning so there were in reality 40 answers required and with one point for each, and one point each for every item in the other division, a total score of 90 was possible.

The purpose of the paper not being to compare schools, all results were grouped together.

The Contingency Table, No. V, on Page 16 , as well as being the basis for much competition, shows the classification of scores into a frequency distribution with 10 as the step-interval, also the amount of Latin studied with the semester as the step-interval. For present purposes, only the "Totals" rows at the right and at the bottom need be considered. For instance, the "Totals" column at the right shows that 107 pupils of the 1050 obtained a score of 40-49. The "Totals" row at the bottom shows that 574 pupils of the 1050 tested had never studied Latin.

Stated in statistical terms, the purpose of the paper is to find out if there is any correlation between the pupils' understanding of certain Latin elements in English, as evidenced by their scores on the present test, and the length of time they have studied Latin.

In the field of statistics "r" represents the coefficient of correlation, i.e., the "device whereby relationship is expressed on a quantitative scale."[1] However "when the facts in which we are interested cannot be conveniently measured, but can be grouped into classes or categories,"[2] the Contingency Method is used, in which C,

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[1] Garrett, Statistics in Psychology and Education, p.149.
[2] Ibid. p.195.

the Coefficient of Mean Square Contingency expresses the relation. On Page 16 is the Contingency Table for the Calculation of C.

The figures along the top represent the semesters of Latin studied and as was previously noted, at the left are the scores with 10 as the step-interval. To illustrate, 15 pupils who had studied Latin 2 semesters received a score of 30-39 and 43 with the same amount of study attained grades of 20-29.

The figures in parentheses in each box represent independence values, i.e., the numbers one would expect to find in the boxes regardless of any relation in the matter of score and length of time spent on Latin.

Since Garrett says "C may be taken as practically equivalent to "r", (1) when the grouping is relatively fine,--5 x 5 fold or finer; (2) when the sample is large; (3) when we know, or are justified in assuming, that the traits we are correlating are normally distributed." then the present C the calculation of which is shown in Table VI, Pages 17-18, may be taken as roughly equal to "r."[1]

Although an "r" from $\pm$.40 to $\pm$.70 is considered to denote "substantial or marked relationship," in view of the fact that C cannot be larger than .943,[2] the present result, C = .64 may be interpreted as indicative of a very substantial or even high correlation between understanding of Latin elements in English and semesters of Latin studied.

It is clear that there are variable factors in the problem. For example, only pupils of better than average ability to do school work are, in general, encouraged to study Latin and prepare for college.

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[1]Garrett, Statistics in Psychology and Education, p.201.
[2]Ibid. p.200.

Critics might say, then, that the better scores made by the Latin group are probably accountable to more native ability. The writer, realizing this possibility, asked the teachers to give the I.Q.'s of the pupils tested. But only 356 I.Q.'s were provided. This number, although small, is sufficient for comparison so the relation between I.Q. and score on the test was computed. C for the 356 proved to be .42. This contingency table and the calculation of C are found on pages 19-20 .

Since it is necessary in applying the partial correlation formula to have three relations, the C showing relation between terms of Latin and I.Q.'s was calculated and is .78. See Table IX, Pages 23-25.

The partial correlation formula is $r_{12.3} = \dfrac{r_{12} - r_{13} \times r_{23}}{1-r_{13} \times 1-r_{23}}$[1].

Substitution of the values of r_{12}, which is .64, r_{13} which is .42, and r_{23} which is .78, gives a partial coefficient $r_{12.3} = .55$ as against a "raw" coefficient, r_{12} of .64. Table X gives the calculation of the partial coefficient.

It is evident that if the group were of the same degree of general intelligence there would be a less close correspondence between the score earned on the writer's test and the number of Latin terms, than there is when the members of the group possess varying degrees of general intelligence and this is certainly the result to be expected.

Still a coefficient of .55 is considered to show substantial or marked relationship. Latin teachers should be overjoyed to have figures back up their opinions and beliefs.

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[1]Garrett, <u>Statistics in Psychology and Education</u>, p.225

Another variable factor to be considered is that of home environment. A pupil who had never studied Latin might be able to understand many of the items on the test as a result of living in a cultured family. The teachers of the pupils tested were asked to give their estimate as to the type of home from which the pupil came, i.e., average, cultured or uneducated. Data were supplied for 453 pupils. Again the results were wholly inadequate but as a matter of interest C was computed in a 3 x 3 fold table and found to be .311. The only conclusion justified is that on the surface there appears to be some positive correlation between the home environment and the scores on this test. The table and calculation are found on Pages 21-22.

For the purpose of comparing the groups classified by semesters of Latin studied, the averages and standard deviations for each semester group and also for the whole group were found. The average score for the whole group was calculated and is 14.28. See Table II Page 27. The σ average was computed (See Page 28) and thus the chances are 6826 in 10,000 or 68 in 100 that the obtained average of 22.46 does not diverge from the true average by more than $\pm$ 1σav., i.e. by more than $\pm$ .4407. Stated in another way--the chances are 68 in 100 that the true average lies within the limits 22.46 +.4407 and 22.46-.4407, or between 22.9007 and 22.0193. Furthermore there are 9973 chances in 10,000 that the true average lies within the limits 22.46 $\pm$ 3 x .4407 or between 23.782 and 21.138.

The calculation of σ_σ also on Page 28 is interpreted that the chances are 68 in 100 that 14.28 does not differ from the true σ by more than $\pm$ .3117. We can be practically certain, then, that the true σ lies within the limits $14.28 \pm 3 \times .3117$ or between 15.2151 and 13.3449.

The calculations of the Average and S.D. for each semester group are on Pages 29-37. For ease of understanding, the results are tabulated in the first three columns of Table XXX, Page 45.

The use of the reliability formula for the difference between two averages has given such wide ranges in which the true difference may lie that it is impossible to say that there is a certain per cent increase in the score of one group over another. For calculations see Pages 38-44. For tabulation see Page 45.

Yet, "a $\frac{D}{\sigma \text{diff.}}$ of 3 means practically complete reliability."[1] Therefore as shown by Table XXXI there is complete reliability in the case of (1) the difference between the average of the non-Latin and 2 semester groups, (2) the difference between the 2 semester and 4 semester groups, (3) the difference between the 4 and 6 semester groups and (4) the difference between the 6 and 7 semester groups.

The obtained average for the 8 semester group is .03 lower than that of the 7 semester group. Of course, this will not always be the case. Moreover, the test was given in the middle of the year when the present seniors had studied Latin only 7 semesters, so the 8 semester group is composed perhaps of Post Graduate pupils no longer taking Latin or even of students who should have placed themselves in the 7 semester group. The number 29 is small so the 8 semester group has been disregarded in favor of the more representative 7 semester group.

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[1]Garrett, Statistics in Psychology and Education, p.133.

"It is usually customary to take a $\frac{D}{\sigma \text{diff.}}$ of 3 as indicative of complete reliability..................A $\frac{D}{\sigma \text{diff.}}$ greater than 3 is to be taken as indicating just so much added reliability."[1]

Table XXXIshows that the average score of pupils who have taken Latin for one year is always better than that of the non-Latin group on the same test such as was administered in this investigation; that the average score of pupils who have studied Latin 2 years is always higher than that of those with 1 year of Latin; that the same is true in regard to the superiority of 3 year Latin over 2 year Latin pupils; that even after only one semester more of Latin study, pupils' scores will always be higher than those of the 3 year group.

This paper has indicated statistically, for the group studied, that the study of Latin does function to a considerable extent in increasing the ability of Latin students to understand the Latin words, phrases, abbreviations and quotations commonly occurring in English but it has not been able to state accurately to what extent, due to limitations of data supplied by the schools.

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[1]Garrett, <u>Statistics in Psychology and Education</u>, p.133

TABLE V

9 X 9 FOLD CONTINGENCY TABLE SHOWING SEMESTERS OF LATIN AND SCORE

SEMESTERS OF LATIN STUDIED

	0	1	2	3	4	5	6	7	8	Totals
80 - 89										
70 - 79								(.20) 2	(.08) 1	3
60 - 69					(.61) 1	(.2) 1		(.41) 1	(.17) 3	6
50 - 59			(4.26) 1		(4.18) 7	(1.37) 2	(1.91) 4	(2.77) 21	(1.13) 6	41
40 - 49	(58.49) 1		(11.11) 5	(3.77) 5	(10.90) 17	(3.57) 14	(5.24) 20	(7.24) 34	(2.96) 11	107
30 - 39	(6.34) 10	(4.09) 4	(12.04) 15	(4.09) 10	(11.82) 37	(3.87) 11	(5.63) 16	(7.84) 8	(3.20) 5	116
20 - 29	(110.97) 79	(7.15) 12	(21.08) 43	(7.15) 16	(20.69) 28	(6.77) 7	(9.86) 11	(13.73) 4	(5.61) 3	203
10 - 19	(231.70) 30	(13.71) 19	(40.04) 43	(13.71) 5	(39.64) 17			(26.30) 1		389
0 - 9	(101.13) 180	(6.05) 2	(19.20) 2	(6.05) 1						185
Totals	574	37	109	37	107	35	51.	71	29	1050

TABLE VI

THE CALCULATION OF MEAN SQUARE CONTINGENCY
COLUMN I

$$\frac{3 \times 71}{1050} = .20$$
$$\frac{3 \times 29}{1050} = .08$$
$$\frac{6 \times 107}{1050} = .61$$
$$\frac{6 \times 35}{1050} = .2$$
$$\frac{6 \times 71}{1050} = .41$$
$$\frac{6 \times 3}{1050} = .17$$
$$\frac{41 \times 109}{1050} = 4.26$$
$$\frac{41 \times 107}{1050} = 4.18$$
$$\frac{41 \times 35}{1050} = 1.37$$
$$\frac{41 \times 51}{1050} = 1.91$$
$$\frac{41 \times 71}{1050} = 2.77$$
$$\frac{41 \times 29}{1050} = 1.13$$
$$\frac{107 \times 574}{1050} = 58.49$$
$$\frac{107 \times 109}{1050} = 11.11$$
$$\frac{107 \times 37}{1050} = 3.77$$
$$\frac{107 \times 107}{1050} = 10.90$$
$$\frac{107 \times 35}{1050} = 3.57$$
$$\frac{107 \times 51}{1050} = 5.24$$
$$\frac{107 \times 71}{1050} = 7.24$$
$$\frac{107 \times 29}{1050} = 2.96$$
$$\frac{116 \times 574}{1050} = 63.41$$
$$\frac{116 \times 37}{1050} = 4.09$$
$$\frac{116 \times 109}{1050} = 12.04$$
$$\frac{116 \times 37}{1050} = 4.09$$
$$\frac{116 \times 107}{1050} = 11.82$$
$$\frac{116 \times 35}{1050} = 3.87$$
$$\frac{116 \times 51}{1050} = 5.63$$
$$\frac{116 \times 71}{1050} = 7.84$$
$$\frac{116 \times 29}{1050} = 3.20$$
$$\frac{203 \times 574}{1050} = 110.97$$
$$\frac{203 \times 37}{1050} = 7.15$$
$$\frac{203 \times 104}{1050} = 21.08$$
$$\frac{203 \times 37}{1050} = 7.15$$
$$\frac{203 \times 107}{1050} = 20.69$$
$$\frac{203 \times 35}{1050} = 6.77$$
$$\frac{203 \times 51}{1050} = 9.86$$
$$\frac{203 \times 71}{1050} = 13.73$$
$$\frac{203 \times 29}{1050} = 5.61$$
$$\frac{389 \times 574}{1050} = 231.70$$
$$\frac{389 \times 37}{1050} = 13.71$$
$$\frac{389 \times 109}{1050} = 40.04$$
$$\frac{389 \times 37}{1050} = 13.71$$
$$\frac{389 \times 167}{1050} = 39.64$$
$$\frac{389 \times 71}{1050} = 26.30$$
$$\frac{185 \times 574}{1050} = 101.13$$
$$\frac{185 \times 37}{1050} = 6.05$$
$$\frac{185 \times 109}{1050} = 19.20$$
$$\frac{185 \times 37}{1050} = 6.05$$

TABLE VI (Continued)

THE CALCULATION OF MEAN SQUARE CONTINGENCY
COLUMN II

$\frac{2^2}{.20}$	$= 20.$	$\frac{16^2}{5.63}$	$= 45.5$
$\frac{1^2}{.08}$	$= 12.5$	$\frac{8^2}{7.84}$	$= 8.1$
$\frac{1^2}{.61}$	$= 1.6$	$\frac{5^2}{3.20}$	$= 7.9$
$\frac{1^2}{.2}$	$= 5.$	$\frac{79^2}{110.97}$	$= 5.6$
$\frac{1^2}{.41}$	$= 2.4$	$\frac{12^2}{7.15}$	$= 20.1$
$\frac{3^2}{.17}$	$= 52.9$	$\frac{43^2}{21.08}$	$= 87.9$
$\frac{1^2}{4.26}$	$= .23$	$\frac{16^2}{7.15}$	$= 35.9$
$\frac{7^2}{4.18}$	$= 11.7$	$\frac{28^2}{20.69}$	$= 37.9$
$\frac{4^2}{1.91}$	$= 8.4$	$\frac{49}{6.77}$	$= 6.9$
$\frac{2^2}{1.37}$	$= 2.9$	$\frac{11^2}{9.86}$	$= 12.3$
$\frac{21^2}{2.77}$	$= 1.6$	$\frac{16}{13.73}$	$= 1.2$
$\frac{6^2}{1.13}$	$= 31.9$	$\frac{9}{5.61}$	$= 1.6$
$\frac{1^2}{58.49}$	$= .02$	$\frac{(304)^2}{231.70}$	$= 398.8$
$\frac{5^2}{11.11}$	$= 2.25$	$\frac{19^2}{13.71}$	$= 26.3$
$\frac{5^2}{3.77}$	$= 6.6$	$\frac{43^2}{40.04}$	$= 46.2$
$\frac{17^2}{10.90}$	$= 26.5$	$\frac{25}{13.71}$	$= 1.8$
$\frac{14^2}{3.57}$	$= 54.9$	$\frac{17^2}{39.64}$	$= 7.3$
$\frac{20^2}{5.24}$	$= 76.3$	$\frac{1}{26.30}$	$= .04$
$\frac{34^2}{7.24}$	$= 159.5$	$\frac{180^2}{101.13}$	$= 320.38$
$\frac{11^2}{2.96}$	$= 40.9$	$\frac{4}{6.05}$	$= .7$
$\frac{10^2}{63.41}$	$= 1.6$	$\frac{4}{19.20}$	$= .21$
$\frac{4^2}{4.09}$	$= 3.9$	$\frac{1}{6.05}$	$= \underline{.2}$
$\frac{15^2}{12.04}$	$= 18.7$		1786.73
$\frac{10^2}{4.09}$	$= 24.4$		
$\frac{37^2}{11.82}$	$= 115.9$		
$\frac{11^2}{3.87}$	$= 31.3$		

$$C = \frac{S-N}{S}$$

$$S = 1786.73$$
$$N = \underline{1050.}$$
$$S-N = 736.73$$

$$C = \frac{736.73}{1786.73} = .4123 = .64$$

TABLE VII

4 X 4 FOLD CONTINGENCY TABLE SHOWING I.Q. AND SCORE

SCORES	I.Q. 75-89	90-104	105-119	120-135	Totals
60-79			(1.2) 2	(.4) 1	3
40-59	(5.6) 1	(17.6) 6	(20.8) 25	(6.) 18	50
20-39		(25.6) 20	(30.4) 40	(8.8) 13	73
0-19	(25.8) 39	(80.8) 99	(95.9) 81	(27.8) 11	230
Totals	40	125	148	43	356

TABLE VII(Continued)

4 X 4 FOLD CONTINGENCY TABLE
COLUMN I

$$\frac{3 \times 148}{356} = 1.2$$
$$\frac{3 \times 43}{356} = .4$$
$$\frac{50 \times 40}{356} = 5.6$$
$$\frac{50 \times 125}{356} = 17.6$$
$$\frac{50 \times 148}{356} = 20.8$$
$$\frac{50 \times 43}{356} = 6.0$$
$$\frac{73 \times 125}{356} = 25.6$$
$$\frac{73 \times 148}{356} = 30.4$$
$$\frac{73 \times 43}{356} = 8.8$$
$$\frac{230 \times 40}{356} = 25.8$$
$$\frac{230 \times 125}{356} = 80.8$$
$$\frac{230 \times 148}{356} = 95.90$$
$$\frac{230 \times 43}{356} = 27.8$$

COLUMN II

$$\frac{2^2}{1.2} = 3.3$$
$$\frac{1^2}{.4} = 2.5$$
$$\frac{1^2}{5.6} = .2$$
$$\frac{6^2}{17.6} = 2.0$$
$$\frac{25^2}{20.8} = 30.0$$
$$\frac{18^2}{6} = 54.$$
$$\frac{20^2}{25.6} = 15.6$$
$$\frac{40^2}{30.4} = 52.6$$
$$\frac{13^2}{8.8} = 19.2$$
$$\frac{39^2}{25.8} = 59.00$$
$$\frac{99^2}{80.8} = 121.3$$
$$\frac{81^2}{95.9} = 68.4$$
$$\frac{11^2}{27.8} = 4.4$$

$S = 432.5$

$S = 432.5$
$N = 356.$
$S-N = 76.5$

$$C = \sqrt{\frac{76.5}{432.5} = \frac{15.3}{8.65}}$$
$$= \sqrt{.1768}$$
$$= .42$$

TABLE VIII

3 X 3 FOLD CONTINGENCY TABLE SHOWING TYPE OF HOME AND SCORE

		TYPE OF HOME			
		Uneducated	Average	Cultural	Totals
SCORES	50-74	(5.32) 1	(12.72) 7	(4.97) 15	23
	25-49	(24.96) 13	(59.70) 59	(23.33) 36	108
	0-24	(76.73) 93	(183.58) 190	(71.71) 49	332
	Totals	107	256	100	463

TABLE VIII(Continued)

3 X 3 FOLD CONTINGENCY TABLE
COLUMN I

$\frac{23 \times 107}{463}$	=	5.32
$\frac{23 \times 256}{463}$	=	12.72
$\frac{23 \times 100}{463}$	=	4.97
$\frac{108 \times 107}{463}$	=	24.96
$\frac{108 \times 256}{463}$	=	59.70
$\frac{108 \times 100}{463}$	=	23.33
$\frac{332 \times 107}{463}$	=	76.73
$\frac{332 \times 256}{463}$	=	183.58
$\frac{332 \times 100}{463}$	=	71.71

COLUMN II

$\frac{1^2}{5.32}$	=	.19
$\frac{7^2}{12.72}$	=	3.85
$\frac{15^2}{4.97}$	=	45.27
$\frac{13^2}{24.96}$	=	6.77
$\frac{59^2}{59.70}$	=	58.31
$\frac{36^2}{23.33}$	=	55.55
$\frac{93^2}{76.73}$	=	112.70
$\frac{190^2}{183.58}$	=	196.64
$\frac{49^2}{71.71}$	=	33.48
		S = 512.76

S = 512.76
N = 463.00
S-N = 49.76

$$C = \sqrt{\frac{49.76}{512.76} = .097043}$$

C = .311

TABLE IX

9 X 9 FOLD CONTINGENCY TABLE SHOWING I.Q. AND TERMS OF LATIN

TERMS OF LATIN

I. Q.	0	1	2	3	4	5	6	7	8	Totals
130-136	(3.9) 2			(.1) 1			(.3) 2	(.5) 1		6
123-129	(14.8) 9		(1.5) 1	(.5) 1	(2.3) 3	(.1) 1	(1.1) 2	(1.9) 6		23
116-122	(26.4) 15		(2.7) 2	(.8) 1	(4.1) 9		(4.8) 2	(34.5) 11	(.70) 1	41
109-115	(4.2) 39	(1.1) 2	(4.3) 3	(1.3) 3	(6.7) 11		(3.2) 5	(5.6) 3		66
102-108	(59.9) 61	(1.6) 1	(6.1) 10		(9.4) 7	(.5) 1	(4.4) 4	(7.8) 6	(1.6) 3	93
95-101	(4.) 43	(1.0) 1	(4.0) 6	(1.2) 1	(6.3) 6		(3.0) 2	(5.2) 2	(1.) 1	62
88-94	(27.) 38	(1.0) 2						(3.5) 1	(.7) 1	42
81-87	(9.) 14									14
74-80	(5.9) 8		(.6) 1							9
Totals	229	6	23	7	36	2	17	30	6	356

TABLE IX(Continued)

COLUMN I				COLUMN II	
$\frac{6 \times 229}{356}$ =	3.9	$\frac{93 \times 6}{356}$ =	1.6	$\frac{2^2}{3.9}$ =	$\frac{4}{3.9}$
$\frac{6 \times 7}{356}$ =	.1	$\frac{93 \times 23}{356}$ =	6.1	$\frac{1^2}{.1}$ =	$\frac{1}{.1}$
$\frac{6 \times 17}{356}$ =	.3	$\frac{93 \times 36}{356}$ =	9.4	$\frac{2^2}{.3}$ =	$\frac{4}{.3}$
$\frac{6 \times 30}{356}$ =	.5	$\frac{93 \times 2}{356}$ =	.5	$\frac{1^2}{.5}$ =	$\frac{1}{.5}$
$\frac{23 \times 229}{356}$ =	14.8	$\frac{93 \times 17}{356}$ =	4.4	$\frac{9^2}{14.8}$ =	$\frac{81}{14.8}$
$\frac{23 \times 23}{356}$ =	1.5	$\frac{93 \times 30}{356}$ =	7.8	$\frac{1^2}{1.5}$ =	$\frac{1}{1.5}$
$\frac{23 \times 7}{356}$ =	.5	$\frac{93 \times 6}{356}$ =	1.6	$\frac{1^2}{.5}$ =	$\frac{1}{.5}$
$\frac{23 \times 36}{356}$ =	2.3	$\frac{62 \times 229}{356}$ =	4.	$\frac{3^2}{2.3}$ =	$\frac{9}{2.3}$
$\frac{23 \times 2}{356}$ =	.1	$\frac{62 \times 6}{356}$ =	1.0	$\frac{1^2}{.1}$ =	$\frac{1}{.1}$
$\frac{23 \times 17}{356}$ =	1.1	$\frac{62 \times 23}{356}$ =	4.00	$\frac{2^2}{1.1}$ =	$\frac{4}{1.1}$
$\frac{23 \times 30}{356}$ =	1.9	$\frac{62 \times 7}{356}$ =	1.2	$\frac{6^2}{1.9}$ =	$\frac{36}{1.9}$
$\frac{41 \times 229}{356}$ =	26.4	$\frac{62 \times 36}{356}$ =	6.3	$\frac{15^2}{26.4}$ =	$\frac{225}{26.4}$
$\frac{41 \times 23}{356}$ =	.8	$\frac{62 \times 17}{356}$ =	3.0	$\frac{2^2}{2.7}$ =	$\frac{4}{2.7}$
$\frac{41 \times 36}{356}$ =	4.1	$\frac{62 \times 30}{356}$ =	5.2	$\frac{1^2}{.8}$ =	$\frac{1}{.8}$
$\frac{41 \times 17}{356}$ =	4.8	$\frac{62 \times 6}{356}$ =	1.	$\frac{9^2}{4.1}$ =	$\frac{81}{4.1}$
$\frac{41 \times 30}{356}$ =	34.5	$\frac{42 \times 229}{356}$ =	27.	$\frac{2^2}{4.8}$ =	$\frac{4}{4.8}$
$\frac{41 \times 6}{356}$ =	.70	$\frac{42 \times 6}{356}$ =	.7	$\frac{11^2}{34.5}$ =	$\frac{121}{34.5}$
$\frac{66 \times 229}{356}$ =	4.2	$\frac{42 \times 30}{356}$ =	3.5	$\frac{1^2}{.7}$ =	$\frac{1}{.7}$
$\frac{66 \times 6}{356}$ =	1.1	$\frac{42 \times 6}{356}$ =	.7	$\frac{39^2}{4.2}$ =	$\frac{1521}{4.2}$
$\frac{66 \times 23}{356}$ =	4.3	$\frac{14 \times 229}{356}$ =	9.0	$\frac{2^2}{1.1}$ =	$\frac{4}{1.1}$
$\frac{66 \times 7}{356}$ =	1.3	$\frac{9 \times 229}{356}$ =	5.9	$\frac{3^2}{4.3}$ =	$\frac{9}{4.3}$
$\frac{66 \times 36}{356}$ =	6.7	$\frac{9 \times 23}{356}$ =	.6	$\frac{3^2}{1.3}$ =	$\frac{9}{1.3}$
$\frac{66 \times 17}{356}$ =	3.2			$\frac{11^2}{6.7}$ =	$\frac{121}{6.7}$
$\frac{66 \times 30}{356}$ =	5.6			$\frac{5^2}{3.2}$ =	$\frac{25}{3.2}$
$\frac{93 \times 229}{356}$ =	59.8			$\frac{3^2}{5.6}$ =	$\frac{9}{5.6}$

9 X 9 FOLD CONTINGENCY TABLE SHOWING I.Q. AND TERMS OF LATIN

COLUMN II

$$\frac{61^2}{59.9} = \frac{3721}{59.9}$$
$$\frac{1^2}{1.6} = \frac{1}{1.6}$$
$$\frac{10^2}{6.1} = \frac{100}{6.1}$$
$$\frac{7^2}{9.4} = \frac{49}{9.4}$$
$$\frac{1^2}{.5} = \frac{1}{.5}$$
$$\frac{4^2}{4.4} = \frac{16}{4.4}$$
$$\frac{6^2}{7.8} = \frac{36}{7.8}$$
$$\frac{3^2}{1.6} = \frac{9}{1.6}$$
$$\frac{43^2}{4} = \frac{1849}{4}$$
$$\frac{1^2}{1.0} = \frac{1}{1}$$
$$\frac{6^2}{4} = \frac{36}{4}$$
$$\frac{1^2}{1.2} = \frac{1}{1.2}$$
$$\frac{6^2}{6.3} = \frac{36}{6.3}$$
$$\frac{2^2}{3} = \frac{4}{3}$$
$$\frac{2^2}{5.2} = \frac{4}{5.2}$$
$$\frac{1^2}{1} = \frac{1}{1}$$
$$\frac{38^2}{27} = \frac{1444}{27}$$
$$\frac{2^2}{1} = \frac{4}{1}$$
$$\frac{1^2}{3.5} = \frac{1}{3.5}$$
$$\frac{1^2}{.7} = \frac{1}{.7}$$
$$\frac{14^2}{9} = \frac{196}{9}$$
$$\frac{8^2}{5.9} = \frac{64}{5.9}$$
$$\frac{1^2}{.6} = \frac{1}{.6}$$

S = 1185.4
N = 356.
S-N = 829.4

$$C = \sqrt{\frac{829.4}{1185.4}} = \sqrt{.6153}$$

C = .78

TABLE X

CALCULATION OF THE PARTIAL COEFFICIENT OF CORRELATION

1. = Score

2. = Terms of Latin

3. = I.Q. (--to be held constant)

$r_{12} = .64$

$r_{13} = .42$

$r_{23} = .78$

$$r_{12.3} = \frac{r_{12} - r_{13} \times r_{23}}{\sqrt{1-r_{13}^2} \quad \sqrt{1-r_{23}^2}} =$$

$$r_{12.3} = \frac{.64 - (.42 \times .78)}{\sqrt{1-(.42)^2} \times \sqrt{1-(.78)^2}} =$$

$$\frac{.64 - .3276}{\sqrt{1-.1764} \times \sqrt{1-.6084}}$$

$$= \frac{.3124}{\sqrt{.8236} \times \sqrt{.3916}}$$

$$= \frac{.3124}{.91 \times .62}$$

$$= \frac{.3124}{.5642}$$

$r_{12.3} = .55$

TABLE XI

FREQUENCY DISTRIBUTION OF SCORES
SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION
FOR THE WHOLE DISTRIBUTION

SCORES	M	F	D	FD	FD^2
0-9	5	185	-1	-185(-185)	+185
10-19	15	389	0	0	0
20-29	25	203	+1	+203	+203
30-39	35	116	+2	+232	+464
40-49	45	107	+3	+321	+963
50-59	55	41	+4	+164	+656
60-69	65	6	+5	+30	+150
70-79	75	3	+6	+18	+108
80-89	85	0	+7	0(+968)	0
		N=1050		+783	+2729

1) GA = 15

$c = \frac{783}{1050} = .7457$

$C = .7457 \times 10 = 7.457$

Average = 15+7.457 = 22.457 = 22.46

2) $SD = \sqrt{\frac{\Sigma FD^2}{N} - c^2}$ x the step-interval

$SD = \sqrt{\frac{2729}{1050} - .5561} = \sqrt{2.599047 - .556068} = \sqrt{2.042979} = 1.428 \times 10 = 14.28$

TABLE XII

CALCULATION OF STANDARD ERROR OF THE AVERAGE

$$\sigma \text{ av.} = \frac{\sigma \text{ (dis.)}}{\sqrt{N}}$$

$$\sigma \text{ av.} = \frac{14.28}{\sqrt{1050}} = \frac{14.28}{32.40} = \frac{3.57}{8.10} =$$

.4407

TABLE XIII

CALCULATION OF σ σ

$$\sigma\ \sigma = \frac{\sigma \text{ (dis.)}}{\sqrt{2N}} = \frac{14.28}{\sqrt{2100}} = \frac{14.28}{45.82} = \frac{7.14}{22.91} =$$

.3117

TABLE XIV

FREQUENCY DISTRIBUTION OF SCORES OF O SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
0-9	5	180	-1	-180(-180)	+180
10-19	15	304	0	0	0
20-29	25	79	+1	+79	+79
30-39	35	10	+2	+20	+40
40-49	45	1	+3	+3(+102)	-9
		N=574		-78	-308

1) GA = 15

$$c = \frac{78}{574} = -.1358$$

$$C = -1.358$$

Average = 15-1.358 = 13.64

2) $$SD = \sqrt{\frac{308}{574} - (.1358)^2} \times 10 = \sqrt{.536585-.018446} \times 10 =$$

$$= \sqrt{.518139} \times 10 = .719 \times 10 = 7.19$$

TABLE XV

FREQUENCY DISTRIBUTION OF SCORES OF 1 SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
0-9	5	2	-1	-2(-2)	+2
10-19	15	19	0	0	0
20-29	25	12	+1	+12	+12
30-39	35	4	+2	+8(+20)	+16
		N=37		+18	30

1) GA = 15

c = .4864

C = 4.864

Average = 15+4.864 = 19.86

2) $SD = \sqrt{\frac{\Sigma FD^2}{N} - c^2} \times 10 = \sqrt{\frac{30}{37} - .236584} \times 10 =$

$\sqrt{\begin{array}{r} .810810 \\ -\ \underline{.236584} \\ .574226 \end{array}} \times 10 = .757 \times 10 = 7.57$

TABLE XVI

FREQUENCY DISTRIBUTION OF SCORES OF 2 SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
0-9	5	2	-1	- 2(-2)	+2
10-19	15	43	0	0	0
20-29	25	43	+1	+43	+43
30-39	35	15	+2	+30	+60
40-49	45	5	+3	+15	+45
50-59	55	1	+4	+ 4(+92)	+16
		N=109		+90	166

1) GA = 15

$c = \frac{90}{109} = .8257$

$C = 8.257$

Average = 15+8.257 = 23.26

2) $SD = \sqrt{\frac{166}{109} - (.8257)^2} \times 10 = \sqrt{1.522935 - .681780} \times 10 =$

$.917 \times 10 = 9.17$

TABLE XVII

FREQUENCY DISTRIBUTION OF SCORES OF 3 SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
0-9	5	1	-2	-2	4
10-19	15	5	-1	-5(-7)	5
20-29	25	16	0	0	0
30-39	35	10	+1	+10	10
40-49	45	5	+2	+10(+10)	20
		N=37		(+3)	39

1) GA = 25

$c = \frac{3}{37} = .08108$

C = 8.108

Average = 33.11

2) $SD = \sqrt{\frac{39}{37} - (.0810)^2} \times 10 = \sqrt{1.054054 - .006561 = 1.047493} \times 10 =$

$= 1.022 \times 10 = 10.22$

TABLE XVIII

FREQUENCY DISTRIBUTION OF SCORES OF 4 SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
10-19	15	17	-2	-34	+68
20-29	25	28	-1	-28(-62)	+28
30-39	35	37	0	0	0
40-49	45	17	+1	+17	+17
50-59	55	7	+2	+14	+28
60-69	65	1	+3	+3(+34)	+9
		N=107		-28	150

1) GA = 35

$c = \frac{-28}{107} = -.2616$

$C = -2.616$

Average = 35-2.616 = 32.38

2) $SD = \sqrt{\frac{150}{107} - (.2616)^2} \times 10 = \sqrt{1.401869 - .042274 = 1.359595} \times 10 =$

$= 1.166 \times 10 = 11.66$

TABLE XIX

FREQUENCY DISTRIBUTION OF SCORES OF 5 SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
20-29	25	7	-1	-7(-7)	+7
30-39	35	11	0	0	0
40-49	45	14	+1	+14	+14
50-59	55	2	+2	+4	+8
60-69	65	1	+3	+3(+21)	+9
		N=35		+14	38

1) GA = 35

$c = \frac{14}{35} = .4$

C = 4.

Average = 39

2) $SD = \sqrt{\frac{38}{35} - .16} \times 10 = \sqrt{1.085714 - .16 = .925714} \times 10 =$

$= .962 \times 10 = 9.62$

TABLE XX

FREQUENCY DISTRIBUTION OF SCORES OF 6 SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
20-29	25	11	-2	-22	44
30-39	35	16	-1	-16(-38)	16
40-49	45	20	0	0	0
50-59	55	4	+1	+4(+4)	+4
		N=51		(-34)	64

1) GA = 45

$c = \frac{34}{51} = -.6666$

C = -6.666

Average = 45-6.666 = 38.33

2) $SD = \sqrt{\frac{64}{51} - (.6666)^2} \times 10 = \sqrt{1.254917 - .444355 = .810562} \times 10 =$

$= .9003 \times 10 = 9.00$

TABLE XXI

FREQUENCY DISTRIBUTION OF SCORES OF 7 SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
10-19	15	1	-3	-3	9
20-29	25	4	-2	-8	16
30-39	35	8	-1	-8(-19)	8
40-49	45	34	0	0	0
50-59	55	21	+1	+21	21
60-69	65	1	+2	+2	4
70-79	75	2	+3	+6(+29)	18
		N=71		+10	76

1) GA = 45

$c = \frac{10}{71} = .1408$

C = 1.408

Average = 45+1.408 = 46.41

2) $SD = \sqrt{\frac{76}{71} - (.1408)^2} \times 10 = \sqrt{1.070422 - .00715264 = 1.063270} \times 10 =$

$= 1.031 \times 10 = 10.31$

TABLE XXII

FREQUENCY DISTRIBUTION OF SCORES OF 8 SEMESTER LATIN GROUP SHOWING CALCULATION OF THE AVERAGE AND STANDARD DEVIATION

SCORES	M	F	D	FD	FD^2
20-29	25	3	-2	-6	12
30-39	35	5	-1	-5(-11)	5
40-49	45	11	0	0	0
50-59	55	6	+1	+6	6
60-69	65	3	+2	+6	12
70-79	75	1	+3	+3(+15)	9
		N=29		+4	44

1) GA = 45

$$c = \frac{4}{29} = .13790$$

$$C = 1.379$$

$$\text{Average} = 45+1.379 = 46.38$$

2) $$SD = \sqrt{\frac{44}{29} - (.1379)^2} \times 10 = \sqrt{\frac{1.517241-.019016}{1.498225}} = \quad \times 10 =$$

$$= 1.224 \times 10 = 12.24$$

TABLE XXIII

CALCULATION OF σ(DIFF.) BETWEEN SCORES OF NON-LATIN AND 2 SEMESTER LATIN GROUPS

	N	Av.	σ
0 Latin	574	13.64	7.19
2 semester	109	23.26	9.17

Obtained difference = 9.62 in favor of 2 semester group.

$$\sigma\text{(diff.)} = \sqrt{\sigma^2(\text{av.}1) + \sigma^2(\text{av.}2)}$$

$$\sigma\text{ av.}(1) = \frac{\sigma(\text{dis.})}{\sqrt{N}} = \frac{7.19}{\sqrt{574}} = \frac{7.19}{23.96} = .3000$$

$$\sigma\text{ av.}(2) = \frac{9.17}{\sqrt{109}} = \frac{9.17}{10.44} = .8783$$

$$\sigma\text{(diff.)} = \sqrt{(.3000)^2 + (.8783)^2} =$$

$$\sqrt{.9000 + .7724} \qquad \sqrt{1.6724} = 1.29$$

The chances are 68 in 100 that the obtained difference of 9.62 does not diverge from the true difference by more than $\pm$ 1.29, and that the chances are 99 in 100 that 9.62 does not differ from the true difference by more than 3 x $\pm$ 1.29--by more than $\pm$ 3.87.

We may be almost certain that the true difference between the averages of the non-Latin and 2 semester Latin groups lies within the limits 9.62 $\pm$ 1.29 or between 10.91 and 8.33.

TABLE XXIV

CALCULATION OF σ (DIFF.) BETWEEN SCORES OF NON-LATIN AND 4 SEMESTER LATIN GROUPS

	N	Av.	σ (dis.)
0 semester	574	13.64	7.19
4 semester	107	32.38	11.66

Obtained difference = 18.74 in favor of 4 semester group.

σ av.(1) = .3000

σ av.(2) = 1.1276

$$\sigma(\text{diff.}) = \sqrt{(.3000)^2 + (1.1276)^2} = \sqrt{.9000 + 1.2715} = \sqrt{2.1715} = 1.47$$

The chances are 68 in 100 that the obtained difference of 18.74 does not diverge from the true difference by more than ± 1.47; the chances are 99 in 100 that 18.74 does not differ from the true difference by more than $3 \times \pm 1.47$--by more than 4.41.

We may be almost certain that the true difference between the averages of the non-Latin and 4 semester Latin groups lies within the limits 18.74 ± 4.41 or between 23.15 and 14.33.

TABLE XXV

CALCULATION OF σ(DIFF.) BETWEEN SCORES OF NON-LATIN AND 6 SEMESTER LATIN GROUPS

	N	Av.	σ(dis.)
0 Latin	574	13.64	7.19
6 semester	51	38.33	9.00

Obtained difference = 24.69 in favor of 6 semester group.

σ av.(1) = .3000

σ av.(2) = 1.2605

$$\sigma\text{(diff.)} = \sqrt{(.3000)^2 + (1.2605)^2} = \sqrt{.9000 + 1.5889} = \sqrt{2.4889} = 1.57$$

The chances are 68 in 100 that the obtained difference of 24.69 does not diverge from the true difference by more than ± 1.57; the chances are 99 in 100 that 24.69 does not differ from the true difference by more than $3 \times \pm 1.57$--by more than 4.71.

We may be almost certain that the true difference between the averages of the non-Latin and 6 semester Latin groups lies within the limits of 24.69 ± 4.71 or between 29.40 and 19.98.

TABLE XXVI

CALCULATION OF σ (DIFF.) BETWEEN SCORES OF NON-LATIN AND 7 SEMESTER LATIN GROUPS

	N	Av.	σ(dis.)
0 semester	574	13.64	7.19
7 semester	71	46.41	10.31

Obtained difference = 32.77 in favor of 7 semester group.

σ av.(1) = .3000

σ av.(2) = 1.2230

$$\sigma\ (\text{diff.}) = \sqrt{(.3000)^2 + (1.2230)^2} = \sqrt{.9000 + 1.4957} = \sqrt{2.3957} = 1.54$$

The chances are 60 in 100 that the obtained difference of 32.77 does not diverge from the true difference by more than $\pm$ 1.54; the chances are 99 in 100 that 32.77 does not differ from the true difference by more than 3 x $\pm$ 1.54--by more than 4.62.

We may be almost certain that the true difference between the averages of the non-Latin and 7 semester Latin groups lies within the limits 32.77 $\pm$ 4.62 or between 37.39 and 28.15.

TABLE XXVII

CALCULATION OF σ (DIFF.) BETWEEN SCORES OF 2 SEMESTER AND 4 SEMESTER LATIN GROUPS

	N	Av.	σ (dis.)
2 semester	109	23.26	9.17
4 semester	107	32.38	11.66

Obtained difference = 9.12 in favor of 4 semester group.

$$\sigma \text{ av.}(1) = \frac{(\text{dis})}{\sqrt{N}} = \frac{9.17}{\sqrt{109}} = \frac{9.17}{10.44} = .8783$$

$$\sigma \text{ av.}(2) = \frac{11.66}{\sqrt{107}} = \frac{11.66}{10.34} = 1.1276$$

$$\sigma \text{ (diff.)} = \sqrt{\begin{matrix}(.8783)^2 + (1.1276)^2 \\ .7724 + 1.2715\end{matrix}} = \sqrt{2.0439} = 1.42$$

The chances are 68 in 100 that the obtained difference of 9.12 does not diverge from the true difference by more than ± 1.42; and the chances are 99 in 100 that 9.12 does not differ from the true difference by more than 3 x $\pm$ 1.42--by more than $\pm$ 4.26.

We may be almost certain that the true difference between the averages of the 2 semester Latin and 4 semester Latin groups lies within the limits 9.12 $\pm$ 4.26 or between 13.38 and 4.86.

TABLE XXVIII

CALCULATION OF σ (DIFF) BETWEEN SCORES OF 4 SEMESTER AND 6 SEMESTER LATIN GROUPS

	N	Av.	σ (dis.)
4 semester	107	32.38	11.66
6 semester	51	38.33	9.00

Obtained difference = 5.95 in favor of 6 semester group.

$$\sigma \text{ av.}(1) = \frac{11.66}{\sqrt{107}} = \frac{11.66}{10.34} = 1.1276$$

$$\sigma \text{ av.}(2) = \frac{9.00}{\sqrt{51}} = \frac{9.00}{7.14} = 1.2605$$

$$\sigma \text{ (diff.)} = \sqrt{\underset{1.2715}{(1.1276)^2} + \underset{1.5889}{(1.2605)^2}} = \sqrt{2.8604} = 1.69$$

The chances are 68 in 100 that the obtained difference of 5.95 does not diverge from the true difference by more than $\pm$ 1.69; and the chances are 99 in 100 that 5.95 does not differ from the true difference by more than 3 x $\pm$ 1.69--by more than $\pm$ 5.07.

We may be almost certain that the true difference between the averages of the 4 semester Latin and 6 semester Latin group lies within the limits 5.95 $\pm$ 5.07 or between 11.02 and .88.

TABLE XXIX

CALCULATION OF σ(DIFF.) BETWEEN SCORES OF 6 SEMESTER AND 7 SEMESTER LATIN GROUPS

	N	Av.	σ(dis.)
6 semester	51	38.33	9.00
7 semester	71	46.41	10.31

Obtained difference = 8.08 in favor of 7 semester group.

$$\sigma \text{ av.}(1) = \frac{9.00}{\sqrt{51}} = \frac{9.00}{7.14} = 1.2605$$

$$\sigma \text{ av.}(2) = \frac{10.31}{\sqrt{71}} = \frac{10.31}{8.43} = 1.2230$$

$$\sigma \text{ (diff.)} = \sqrt{\begin{matrix}(1.2605)^2 + (1.223)^2 \\ 1.5889 \quad + \quad 1.4957\end{matrix}} = \sqrt{3.0846} = 1.75$$

The chances are 68 in 100 that the obtained difference of 8.08 does not diverge from the true difference by more than ± 1.75; the chances are 99 in 100 that 8.08 does not differ from the true difference by more than $3 \times \pm 1.75$--by more than 5.25.

We may be almost certain that the true difference between the averages of the 6 semester and 7 semester Latin groups lies within the limits 8.08 ± 5.25 or between 13.33 and 2.83.

TABLE XXX

AVERAGES, S.D, CERTAIN OBTAINED DIFFERENCES BETWEEN AVERAGES AND LIMITS OF THESE DIFFERENCES

	Obtained Average	S.D	Obtained difference between the average of the group and the preceding group.	Limits of true difference between averages
No Latin	13.64	7.19		
1 semester	19.86	7.57		
2 semesters	23.26	9.17	9.62	10.91-8.33
3 "	33.11	10.22		
4 "	32.38	11.66	9.12	13.38-4.86
5 "	39.00	9.62		
6 "	38.33	9.00	5.95	11.02-.88
7 "	46.41	10.31	8.08	13.33-2.83
8 "	46.38	12.24		
No Latin				
2 semesters			9.62	10.91-8.33
4 "			8.74	23.15-14.33
6 "			24.69	29.40-19.98
7 "			32.77	37.39-28.15

TABLE XXXI

THE RELIABILITY OF DIFFERENCES

1) 0 and 2 semester Latin groups.

$$\frac{D}{\sigma \text{ diff.}} = \frac{9.62}{1.29} = 7.45$$

2) 2 and 4 semester Latin groups.

$$\frac{D}{\sigma \text{ diff.}} = \frac{9.12}{1.42} = 6.40$$

3) 4 and 6 semester Latin groups.

$$\frac{D}{\sigma \text{ diff.}} = \frac{5.95}{1.69} = 3.52$$

4) 6 and 7 semester Latin groups.

$$\frac{D}{\sigma \text{ diff.}} = \frac{8.08}{1.75} = 4.61$$

PART IV.

CONSTRUCTIVE RECOMMENDATIONS WITH THE AIM OF IMPROVING EXISTING CONDITIONS

There is a challenge to Latin teachers in the fact that the obtained average for the non-Latin group was found to be 13.64 while that for the 1 year Latin group was 23.36,--a difference of only 9.62. One would expect that after a year of Latin study the average pupil would have learned the meaning of more than 10 of these items in addition to those he knew before taking Latin.

An interesting experiment for a first-year Latin teacher would be to give to her beginners such a test at the commencement of the year and keep the results until the close of the year when the same test would be administered. By comparing the results of both she could thus test her own efficiency in the matter of attaining this objective. Also the achievement along this line of each individual pupil could be seen. Such a method would be more practical and helpful than to work from averages. The improvement noted for pupils would be subjective rather than objective.

Granted that a teacher wishes to try out this arrangement, she will aim to give definite instruction to accomplish her end. It goes without saying that the understanding of Latin elements in English is not the sole or most important objective of Latin study. However a few words each class period in explanation of some phrase or abbreviation which is related to the regular work would be productive of results. For example, when the words <u>ante</u> or <u>post</u> are met for the first time, the teacher could explain <u>ante bellum</u> or post bellum. If she wishes to give both and wishes to make clear forever the difference between ante and post, she could mention the word postscript which would always indicate in their minds something after a letter. With postscript, she could explain the abbreviation P.S.

Probably most teachers do make these associations for the pupils, but for the benefit of the average pupil, it is necessary that they do so. Nor is once enough. Occasionally the pupils should be asked the meaning orally. A short written test or better yet a part of a regular test devoted to this work, would show the pupils there is a real need for them to know rather than just guess at the answers.

The textbooks developed since the publication of the Classical Investigation report have provided lists of these Latin elements in English and many have helped the teacher by making the associations at the proper time. Latin for Today, a book by Mason D. Gray and Thornton Jenkins, has done this consistently in its vocabulary lists. The Latin word is given, then a related word or words and then there is a meaning column. The writer from experience finds that pupils often skip over the related word column so it is necessary for the words to be taken up in class.

It is true that all the Latin words, phrases and abbreviations with which we want our young people to be familiar do not occur in the work of the first year or in that of any one year. Yet if the teacher takes every opportunity to introduce and explain any that have a bearing on the subject in hand, it would seem that results should be better than this investigation has shown.

Nor will the teacher be alone in her work. If she sets an example of vigilance, her pupils soon get the habit of bringing in bits of Latin which they have met in other situations. These contributions have a real place in the classroom work. If a pupil finds some Latin he does not understand and puts it before the class, he is using the period as it should be used--as a clearing house of questions unanswered in individual study. If a pupil tells the meaning of his expression, which is unfamiliar to the rest of the class, again he is using the class period properly--he is sharing his knowledge with his classmates.

Professor Mason Gray says of the objective under consideration,

"The better realization of this value depends upon: (1) An intimate knowledge on the part of the teacher of the words and phrases which most commonly occur............(2) A definite plan for bringing such words and phrases to the attention of the pupils at appropriate times."[1]

Later he remarks: "The teacher should place little dependence on sudden inspiration."[2]

The writer cannot refrain from a personal illustration of the value of the teacher's using every opportunity to make an association. To her beginning Latin classes she would show her Wellesley College ring bearing the motto "Non ministrari sed ministrare" and explain it. The pupils who had been in her classes, in general, knew the expression on the writer's test, whereas there were whole schools in which no pupil even tried to interpret the motto. This was presumably due to the fact that the expressionhad never been brought up in class. There were other schools too where the results on this item were good, presumably as a result of class mention of it.

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[1]Mason D. Gray, The Teaching of Latin, P.119.
[2]Ibid. P.119.

Notebooks are of course ever present helps in the matter of application of Latin to the understanding of English but they should be supplementary to class work in this branch,--they should never take the place of class work.

The real contributions of this paper to existing knowledge are the fact that a correlation of .64 is seen to exist between 1050 pupils' knowledge of Latin expressions in English and the length of time they have studied Latin and the fact that in contrast to this "raw" coefficient a partial coefficient of correlation between the same two things, holding the I.Q. constant, was found to be .55. These cannot be taken as infallible truths, however, because other factors such as home environment do enter into the matter. Also the data for each of the 1050 pupils were not supplied.

To summarize, the study of Latin is certainly achieving the objective,--increased understanding of certain elements in English which are related to Latin,--the "certain elements" being Latin words, phrases, abbreviations and quotations.

PART V

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