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THE MEASUREMENT OF ABILITY IN LATIN. PART I. VOCABULARY

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A recent writer¹ on the psychology of language instruction points out the diversity of opinion and the uncertainty which prevail in this field. The reasons for this state of affairs are not far to seek. Problems that arise are solved on a basis of mere opinion or of practical experimentation which is unreliable, ambiguous and unconvincing. Flagstad rightly maintains that the great need is an exact scale for the measurement of results of instruction, which will make possible reliable quantitative comparisons. While many would recognize the desirability of such a scale, the great majority perhaps would question the possibility of its construction. The results to be given in this study represent an attempt to secure such a scale.

Ability in a foreign language may be indicated in three main ways: (1) Scope and accuracy of vocabulary; (2) Ability to understand connected discourse in a foreign language, or, rate and accuracy of translating from a foreign language to the mother tongue, or, from the mother tongue to the foreign language; (3) Knowledge of grammar, syntax, and word derivation. Each or all of these abilities are available for purposes of measurement and are capable of measurement. The present paper will report work done to measure ability in Latin in one of these directions. It will give results from two vocabulary tests—an "Easy Vocabulary Test" (for first-year Latin pupils), and what I shall call "A Standard Vocabulary Test." A subsequent paper will

¹ FLAGSTAD, CHR. B. *Psychologie der Sprachpädagogik*. Leipzig und Berlin, 1913, Vorwort, s. v.

report a study of ability to translate as measured by a sentence test based upon the Standard Vocabulary. Similar studies of ability in German are in progress. For coöperation and assistance in developing these tests I am indebted to many teachers of Latin the country over, the list of which is too long to be given here. I am under especial obligations to Mr. H. A. Brown, Director of the Bureau of Research, Department of Public Instruction, Concord, New Hampshire, and to Dr. Walter S. Monroe, Director of the Bureau of Educational Measurements and Standards, Kansas State Normal School, Emporia, Kansas, for providing an opportunity to give the tests in New Hampshire and Kansas, respectively. Without the interested coöperation of Latin teachers, such a study as this would be impossible.

EASY VOCABULARY TEST

The most obvious evidence of ability and progress in Latin is in the number of Latin words whose meanings are known or whose equivalents in English can be given. Other things being equal, then, the pupil that makes the best score in a vocabulary test will show the highest ability in Latin or will have made the most progress. The essential difficulty in the construction of satisfactory tests lies in the selection of the words to be used. If results are to be comparable beyond the limits of a single class or of classes using the same texts, they should necessarily be such as the pupil has come in contact with and might reasonably be expected to know. The variety of first year texts and the great variation in vocabularies, in spite of the growing tendency to make the first year book introductory to Caesar, and to select the vocabulary from Caesar, make the determination of a satisfactory list of words difficult. Preliminary experimentation begun five years ago was based on a hundred words, fifty in Latin and fifty in English. These words were found to be common to four first-year books, widely used, according to the testimony of Latin teachers; namely, the first-year texts of Collar and Daniell, D'Ooge, Pearson, and Smith and Laing. Subsequent study showed that these words are, with few exceptions, common to twelve of the most recent or commonly used first-year texts. Following is a list of these words as they were given:

Latin Vocabulary Test

1.	
1. adventus	26. interficio
2. caput	27. legatus
3. cur	28. magister
4. dominus	29. laboro
5. pilum	30. mille
6. auxilium	31. parvus
7. civis	32. malus
8. de	33. neque
9. equitatus	34. maneo
10. finis	35. omnis
11. fugio	36. maximus
12. gero	37. primus
13. homo	38. maior
14. ignis	39. par
15. proelium	40. oppugno
16. incolo	41. post
17. pedes	42. relinquo
18. impetus	43. supero
19. ad	44. trans
20. domus	45. occido
21. pulcher	46. sequor
22. inter	47. recipio
23. diu	48. venio
24. conficio	49. vineo
25. ante	50. proximus
2.	
1. farmer	26. broad
2. high	27. hand
3. camp	28. free
4. speed	29. much (adj.)
5. abundance	30. I praise
6. leader	31. better (adj.)
7. I give	32. I fortify
8. the other	33. sailor
9. horse	34. hostage
10. flight	35. gate
11. I hear	36. foot
12. sword	37. smaller
13. good	38. ship
14. dear	39. girl
15. horseman	40. through
16. grain	41. forest
17. son	42. always
18. I throw	43. without
19. place (N)	44. I hold
20. king	45. city
21. I see	46. life
22. easy	47. I make
23. I order	48. I wound
24. I say	49. more
25. war	50. I call

The lists were given in June to 252 first-year pupils in ten schools, the Latin list first and then the English list. The time required varied from three to fifteen minutes. The results for the different schools in terms of the median number of words correct are indicated in the following table.

TABLE I.

Latin Vocabulary Test—100 Words

Median Scores for 252 First Year Pupils in 10 Schools

School	Latin-English	English-Latin
A	45	41
B	44	37
C	41.5	34.5
D	41.5	31.5
E	41	36
F	41	32
G	36	33.5
H	34	34
I	34	29
J	21	19
Median	41.5	35

The striking thing about this table is the great variation shown in the first year classes in ten very good high schools from a score of 45 or 90 percent correct to 21 or 42 percent correct in the Latin-English list, and from 41 or 82 percent to 19 or 38 percent in the English-Latin list. Such variability has frequently been shown in recent years with the application of standard tests and scales and needs no special comment. One is led to wonder, however, at the character and worth of the instruction in Latin where after a year's work 17 pupils on the average missed 29 out of 50 words as easy as those in the Latin-English list.

The distribution of the 252 pupils in each of the tests is indicated in Figs. 1 and 2.

The teachers were requested to mark on the papers the final grade in Latin for the year. In order to determine the validity and value of a vocabulary test as a measure of ability and progress the correlations between performances in the tests and the final grade were calculated for eight schools. Correlations were also determined between the performances in the two tests. These results appear in Table II.

TABLE II.

School	No. of Pupils	Latin-English and Marks	English-Latin and Marks	Latin-English and English-Latin
A	71	.64	.49	.82
B	44	.48	.52	.83
C	36	.59	.75	.92
D	17	.61	.77	.75
E	28	.26	.67	.88
F	7	.26	.68	.94
G	22	.77	.51	.49
H	11	.83	.90	.94
Average		.56	.66	.82

LATIN VOCABULARY TEST

FIGURE I

LATIN VOCABULARY TEST

FIGURE II

The correlations, except in two instances, show a tolerably close agreement between scores and teachers estimates and indicate the usefulness of the tests in rating pupils. The correlations between the two tests are very high and show that either test could be used alone without much error.

ARRANGEMENT OF WORDS IN ORDER OF DIFFICULTY AND THE DETERMINATION OF SCALE VALUES

The scores and correlations above have been determined on the supposition that all of the words are of equal difficulty, which is obviously not true. In scoring a test such as this allowance should be made somehow for the fact that in the same list *pulcher* was correctly given by 99 percent of the 252 pupils while *omnis* was correctly given by 87 percent and *pedes* by 55 percent. To give these words equal values is of course inaccurate. A scale value for each word was determined by the method used by Buckingham,² in scaling words for spelling. At first blush it might appear as if the values could be determined directly from the percentages of times a word was translated correctly but this fails to take into account the form of distribution of mental abilities. Assuming that ability in translating these words follows the normal distribution then the difference of 2 percent between words remote from the median in the curve of distribution, such as *trans* 95 percent correct and *legatus* 93 percent is not the same as the difference between *par* 64 percent correct and *occido* 62 percent correct, though in both pairs the difference is 2 percent. On the assumption of the normal distribution the difference in difficulty between *trans* and *legatus* is about three times as great as that between *par* and *occido*. Pupils so poor in the knowledge of Latin after a year's work as to miss *trans* and *legatus* are far less numerous than those who would miss *par* and *occido*. The percentages of times each word is translated correctly being known, it is possible to locate the 50 words on the base line of a normal frequency surface in terms of the probable error equivalents of these percentages. In order to have a point of reference which would represent an approximation to a zero point in ability, a word, if there were one, so easy that it would be missed by but 5 out of 1000 first year pupils, was arbitrarily

² BUCKINGHAM, B. R. *Spelling Ability—Its Measurement and Distribution*. Columbia University Contributions to Education, New York, 1913.

taken as a point of reference. This point will be found to be 3.8 times the probable error below the median. A word so difficult that it would be given correctly by but 5 out of 1000 pupils would be located at a point 3.8 P. E. above the median. If the 3.8 P. E. is taken as the zero point then the more difficult word would have a value of 7.6. On such a scale the easiest word in the list, *pulcher*, would have a value of .3 while the most difficult would have a value of 5.2. Tables IV and V give the list of words in order of difficulty, the number of times each word was correctly translated, the percent of times correct, and the corresponding P. E. values subtracted from 3.8 P. E.

The two lists may be used by teachers and supervisors in testing first-year pupils in various ways:

1. The lists may be given as they stand without reference to variation in difficulty of the words, *i. e.*, without reference to the scale values. Comparisons may be made with the scores obtained in ten schools as shown in Table I.

2. The lists may be given as they are and the appropriate values or weights may be assigned to each word in scoring the results. The giving of varying weights to different examination questions is a familiar practice among teachers. The weights given in such cases are based merely on the teacher's judgment as to the amount of credit to be given. The weights assigned here have been scientifically determined on a basis of actual pupil performance in a sufficiently large number of cases to possess a very considerable reliability. A perfect score in the Latin-English list would be 125.5 points. Toward this score the pupil would be given 1.4 points for correctly translating *domus*, 2.8 points for *interficio*, and 3.6 points for *pedes*. Such scoring would be far more equitable than to give each word the same value.

3. A smaller list of words differing in difficulty by equal steps may be selected. For ready comparison, of a large number of schools and pupils such a list would be useful. A ten-word list of this nature would be *proelium*, 1.2, *magister*, 1.5, *ante*, 1.8, *de*, 2.1, *ignis*, 2.4, *dominus*, 2.7, *recipio*, 3.0, *par*, 3.3, *pedes*, 3.6, *incolo*, 4.1.

4. A smaller list, say of 20 words, *caput* to *recipio*, where the differences in values are so small that they can be neglected without great error would be useful for many testing purposes and simplify the problem of scoring.

TABLE IV.

Latin-English Words in Order of Difficulty and Their P. E. Values Subtracted from 3.8 P. E.

	No. Cor.	Percent Cor.	Scale Value
1. pulcher	250	.99	0 3
2. parvus	244	.97	1.1
3. proelium	241	.96	1.2
4. laboro..	240	.95	1.4
5. trans..	239	.95	1.4
6. domus	239	.95	1.4
7. magister..	236	.94	1.5
8. legatus.....	234	.93	1 6
9. auxilium	233	.92	1 7
10. malus. ..	230	.91	1.8
11. ante	230	.91	1.8
12. venio.....	230	.91	1.8
13. ad	229	.91	1.8
14. primus	227	.90	1.9
15. post	225	.89	2.0
16. caput	224	.89	2 0
17. finis.	222	.88	2.1
18. de.	220	.87	2.1
19. omnis	220	.87	2.1
20. inter	216	.86	2.2
21. mille	214	.85	2.3
22. oppugno	214	.85	2 3
23. civis	212	.85	2 3
24. cur.	211	.84	2.3
25. fugio.....	211	.84	2.3
26. ignis	210	.83	2 4
27. equitatus.	199	.79	2.6
28. maximus	198	.78	2 6
29. homo.	196	.77	2 7
30. dominus	194	.77	2.7
31. interficio	189	.75	2.8
32. gero	187	.74	2 8
33. vinco.. . . .	181	.72	2 9
34. neque	181	.72	2.9
35. recipio	175	.69	3 0
36. relinquo	170	.67	3 1
37. impetus	170	.67	3 1
38. sequor	168	.67	3 2
39. pilum.	167	.66	3 2
40. diu	165	.65	3.2
41. par	162	.64	3 3
42. adventus	160	.63	3 3
43. supero	159	.63	3 3
44. occido	157	.62	3.3
45. maior..	142	.56	3 6
46. pedes.	139	.55	3 6
47. maneo	135	.53	3 7
48. incolo.	102	.40	4 1
49. proximus.. . . .	95	.38	4.2
50. conficio.. . . .	42	.17	5.2

TABLE V.

English-Latin Words in Order of Difficulty and Their P. E. Values Subtracted from 3.8 P. E.

	No. Cor.	Percent Cor.	Scale Value
1. farmer..	244	.97	1.1
2. girl..	236	.93	1.6
3. good..	234	.92	1.7
4. king..	233	.92	1.7
5. war..	232	.92	1.7
6. I see..	229	.91	1.8
7. I hear..	228	.90	1.9
8. I praise..	216	.86	2.2
9. I call	216	.85	2.3
10. sailor..	215	.85	2.3
11. I make	213	.84	2.3
12. camp	210	.83	2.3
13. son	208	.82	2.4
14. leader..	207	.82	2.4
15. I give	207	.82	2.4
16. high..	206	.82	2.5
17. city..	203	.80	2.6
18. hand	201	.80	2.6
19. I order	199	.79	2.6
20. forest..	195	.77	2.7
21. I wound	194	.77	2.7
22. I say....	194	.77	2.7
23. horse....	194	.77	2.7
24. dear....	192	.76	2.8
25. grain	183	.73	2.9
26. gate....	182	.72	2.9
27. sword.....	174	.69	3.0
28. much (adj.)..	169	.67	3.1
29. broad	166	.66	3.2
30. better (adj.)	160	.64	3.3
31. place (N)..	159	.63	3.3
32. I fortify	158	.63	3.3
33. through..	157	.62	3.3
34. free	153	.61	3.3
35. foot	147	.58	3.5
36. easy....	143	.57	3.5
37. I hold..	141	.56	3.6
38. I throw..	137	.55	3.6
39. ship..	133	.53	3.7
40. always	133	.53	3.7
41. like	132	.52	3.7
42. abundance..	132	.52	3.7
43. flight	123	.49	3.8
44. more....	119	.47	3.9
45. without	113	.44	4.0
46. smaller..	104	.41	4.1
47. hostage..	91	.36	4.3
48. horseman..	91	.36	4.3
49. the other	89	.35	4.3
50. speed.....	74	.29	4.6

147.9

STANDARD VOCABULARY TEST

Experience with the hundred words reported above had seemed to show the value of a vocabulary test for many purposes—the rating of pupils, comparison of schools and teachers, a study of methods, etc.; hence, a further study of vocabularies was made. This was done partly to secure a larger list of words and partly because of the fact that occasionally teachers returned the first year lists with certain words marked as not occurring in the texts which they used. In order to overcome this difficulty and to secure a true standard vocabulary a tabulation was made of all the words occurring in thirteen recent or widely used beginners' books. The vocabularies in these books ranged from 750 to 1750 words. The total number of different words found in all the books was 3350. Of these 319 were common to all the books. Using Lodge's³ tabulation of all the words used in Caesar, Cicero, and Vergil, and their frequency of occurrence, all of the words of the 319 that are not used by all three of these authors were dropped. This reduced the list to the 239 words which form the basis of this study. This list of words would seem to be in the real sense a standard vocabulary for high school Latin. While the words will vary in frequency of use in the different books, all pupils, no matter what books are used, will have come in contact with them in their first year and will continue in contact with them throughout the four years of high school Latin.

Blanks containing the words arranged in alphabetic order were printed and have been used for various purposes during the past two years in a considerable number of schools. In the interest of economizing space in this article the blank is not reproduced. The list appears in Table VII below. For the information of Latin teachers and students of education the 80 words, which were dropped on the ground that they did not appear in Caesar, Cicero, and Vergil, are worth publishing. They are the following:

acriter	intellego	pons
agmen	interficio	porto
amicitia	iste	prope
animal	itaque	provincia
bene	legatus	proximus
captivus	legio	quidam

³ LODGE, GONZALEZ. *The Vocabulary of High School Latin*. Columbia University Contributions to Education, New York, 1907.

celeritas	liber	quinque
celeriter	liberi	quo
civitas	libero	reliquus
collis	magis	ripa
convoco	maxime	septem
cornu	minor	septimus
decimus	minus	sex
dissimilis	mons	silva
ducenti	moror	statim
duodecim	multitudo	sub
equitatus	natura	summus
equus	nolo	superior
expugno	numen	sustineo
facile	obses	trans
filia	oppidum	transeo
flumen	optimus	ultimus
fortiter	passus	uter
fossa	persuadeo	vester
frumentum	pes	viginti
gladius	plurimus	vulnero
incolo	plus	

Results with the 239 words in terms of the averages and median numbers correct from 19 schools in three states appear in Table VI. The table gives both the averages and medians for the convenience of teachers or principals who may wish to use one or the other measure of central tendencies. The distribution is skewed and the medians and averages, it will be noted, not only do not coincide except in a few cases, but in some cases the difference is considerable. The average number correct for second year pupils, *e. g.*, is 187 while the median is 195. Exceptionally poor or exceptionally good pupils in a class will produce discrepancies in the two measures.

As in the first year test the striking thing is the wide variation in schools, *e. g.*, in the first year the range from a median of 56 in one school to 209 in another. It is noteworthy that even fourth-year pupils fall short, by a considerable amount, of a perfect score with this easy vocabulary.

ARRANGEMENT OF WORDS IN ORDER OF DIFFICULTY AND THE DETERMINATION OF SCALE VALUES

The averages and medians in Table VI were obtained simply by scoring the number of words correct, regardless of the variation in the difficulty of the words. The main purpose of this study has been to determine first the weights or values to be assigned to each word for each year and finally a general or average scale value for all four years. The essential information

TABLE VI.

Results from Nineteen Schools

School	Averages				School	Medians				School	No. of Pupils			
	I	II	III	IV		I	II	III	IV		I	II	III	IV
A	178	212	225	227	A	175	209	226	227	A	15	14	9	8
B	172	202	215	223	B	172	200	215	229	B	58	37	10	10
C	140	185	215	216	C	144	195	217	217	C	35	20	13	7
D	146	165	207	198	D	149	169	211	205	D	32	31	18	8
E	123	154	160	179	E	123	159	160	184	E	26	37	2	7
F	108	187	192	...	F	110	183	193	...	F	9	8	6	..
G	170	203	...	...	G	170	210	...	...	G	48	24	...	..
H	78	173	190	202	H	56	162	191	208	H	5	5	6	3
I	170	201	222	225	I	173	202	222	223	I	9	3	2	3
J	149	196	222	221	J	152	209	222	218	J	23	9	2	5
K	133	199	220	223	K	136	204	221	225	K	23	19	5	8
L	117	168	205	206	L	115	168	203	208	L	9	12	5	4
M	145	175	206	223	M	149	182	200	224	M	12	10	14	8
N	172	179	205	209	N	174	174	207	216	N	25	17	12	7
O	201	215	220	224	O	209	219	222	225	O	19	18	8	9
P	144	210	216	217	P	150	209	215	217	P	9	4	3	2
Q	...	199	...	...	Q	...	199	...	...	Q	..	9	..	..
R	..	191	..	..	R	...	198	...	...	R	..	6	..	..
S	..	..	..	199	S	...	...	...	199	S	..	..	..	2
Av.	155	187	209	214	Med.	157	195	213	218	Total	357	283	115	92

and the results obtained are found in Table VII which gives the percent. of times each word was correct in each year, the corresponding P. E. values subtracted from the assumed zero point (—3.8 P. E.) and the final scale value. The 39 words that are starred include those which are troublesome to score such as *eo*, *multus*, *ne*, *quod*, those where an English equivalent which must be accepted as correct, is obvious, such as *committo*, *contendo*, *causa*, *consul*, *in*, and those that are so easy as not to be missed at all by third and fourth year pupils, such as *bonus*, *magnus*, *pater* and *sed*. In scoring the words the low percentages correct for *constituo*, *confero*, *contineo*, *infero*, *multus* and *trado* are due to the fact that *I constitute*, *I confer*, *I continue*, *I infer*, *many*, and *I trade* were scored as incorrect. These words are among those starred for omission. These are the only ones the scoring of which calls for especial comment here.

TABLE VII.

	Percents Correct				Year Scale Values				Genl. Scale Values
	I	II	III	IV	I	II	III	IV	
ab.....	92.7	97.5	97.3	98.9	1.6	.9	.9	.4	1.0
acer.....	73.3	68.8	86.0	93.5	2.9	3.1	2.2	1.6	2.4
accipio.....	66.6	79.1	88.6	94.6	3.2	2.6	2.0	1.4	2.3
acies.....	48.1	80.1	85.2	88.0	3.9	2.6	2.3	2.0	2.7
ad.....	91.8	96.4	95.6	97.8	1.7	1.1	1.3	.8	1.2
adventus.....	47.0	81.9	90.4	95.7	3.9	2.4	1.9	1.3	2.4
ager.....	83.5	82.2	80.8	72.8	2.4	2.4	2.5	2.9	2.5
aliquis.....	40.9	47.3	73.9	75.0	4.1	3.9	2.8	2.8	3.4
alius.....	52.9	63.9	71.3	72.8	3.7	3.3	3.0	2.9	3.2
alter.....	38.4	55.1	69.5	75.0	4.2	3.6	3.0	2.8	3.4
altus.....	72.2	71.7	86.0	94.6	2.9	2.9	2.2	1.4	2.4
amicus.....	91.8	96.0	96.5	97.8	1.7	1.2	1.1	.8	1.2
*amitto.....	36.1	65.7	79.9	85.7	4.3	3.2	2.6	2.2	3.1
animus.....	48.1	79.1	99.1	96.7	3.9	2.6	.3	1.1	2.0
annus.....	90.2	95.0	100	98.9	1.9	1.4	0	.4	.9
ante.....	84.0	95.0	99.1	98.9	2.3	1.4	.3	.4	1.1
appello.....	36.1	77.7	89.5	93.5	4.3	2.7	1.9	1.6	2.6
apud.....	60.5	87.8	88.6	96.7	3.4	2.1	2.0	1.1	2.1
*arma.....	87.4	92.2	91.2	96.7	2.1	1.7	1.8	1.1	1.7
atque.....	64.7	90.1	97.3	98.9	3.2	1.9	.9	.4	1.6
audio.....	95.8	97.2	97.3	98.9	1.2	1.0	.9	.4	.9
auxilium.....	91.3	97.2	100	98.9	1.8	1.0	0	.4	.8
bellum.....	97.8	98.9	100	98.9	.8	.4	0	.4	.4
*bonus.....	99.1	98.6	99.1	100	.3	.5	.3	0	.3
capio.....	87.6	92.9	97.3	97.8	2.1	1.6	.9	.8	1.4
caput.....	74.2	78.7	91.2	95.7	2.8	2.6	1.8	1.3	2.1
castra.....	94.4	98.6	100	100	1.3	.5	0	0	.5
*causa.....	87.4	96.1	99.1	98.9	2.1	1.2	.3	.4	1.0
celer.....	68.3	69.3	79.9	84.8	3.1	3.1	2.6	2.3	2.7
centum.....	69.2	88.3	94.7	97.8	3.1	2.0	1.4	.8	1.8
certus.....	32.8	66.9	84.3	89.1	4.5	3.2	2.3	2.0	3.0
cognosco.....	60.8	93.3	98.2	97.8	3.4	1.6	.7	.8	1.6
*committo.....	56.0	66.4	71.3	75.0	3.6	3.2	3.0	2.8	3.1
*confero.....	29.4	60.1	66.9	64.1	4.6	3.4	3.2	3.3	3.6
conficio.....	14.3	38.5	57.4	68.4	5.4	4.2	3.5	3.1	4.1
conicio.....	11.5	60.8	68.7	79.3	5.6	3.4	3.1	2.6	3.7
consilium.....	58.2	85.5	86.0	89.1	3.1	2.2	2.2	2.0	2.4
*constituo.....	25.2	74.2	82.6	87.0	4.8	2.8	2.4	2.1	3.0
*consul.....	90.2	89.5	94.7	93.5	1.9	1.9	1.4	1.6	1.7
*contendo.....	72.0	87.3	95.6	95.7	2.9	2.1	1.3	1.3	1.9
*contineo.....	28.8	51.0	52.1	52.2	4.6	3.8	3.7	3.7	4.0
convenio.....	45.1	72.1	73.0	87.0	4.0	2.9	2.9	2.1	3.0
*copia.....	65.8	64.3	71.3	67.4	3.2	3.3	3.0	3.1	3.1
corpus.....	76.4	86.6	97.3	98.9	2.7	2.2	.9	.4	1.6
cum.....	98.3	99.3	99.1	98.9	.7	.2	.3	.4	.4
eur.....	62.2	70.3	92.1	94.6	3.3	3.0	1.7	1.4	2.4
de.....	85.1	85.5	99.1	98.9	2.3	2.2	.3	.4	1.3
debeo.....	42.3	42.1	75.6	79.3	4.1	4.1	2.8	2.6	3.4

TABLE VII.—Continued

	Percents Correct				Year Scale Values				Genl. Scale Values
	I	II	III	IV	I	II	III	IV	
decem	94.4	97.5	97.3	97.8	1.4	.9	.9	.8	1.0
*defendo	96.3	98.5	100.	98.9	1.2	.5	.0	.4	.5
deligo	17.9	52.6	69.5	79.3	5.2	3.7	3.0	2.6	3.6
deus	79.5	86.2	94.7	100.	2.6	2.2	1.4	.0	1.5
dico	82.3	96.8	99.1	98.9	2.4	1.1	.3	.4	1.0
dies	87.6	92.9	96.5	94.6	2.1	1.6	1.1	1.4	1.5
difficilis	87.6	85.5	87.8	95.7	2.1	2.2	2.1	1.3	1.9
discedo	27.4	51.9	54.7	71.7	4.7	3.7	3.6	2.9	3.7
diu	52.1	58.3	69.5	84.8	3.7	3.5	3.0	2.3	3.1
do	87.6	91.2	93.0	93.5	2.1	1.8	1.6	1.6	1.8
*domus	92.4	97.2	100.	100.	1.7	1.0	.0	.0	.7
duco	91.8	97.9	100.	98.9	1.7	.8	.0	.4	.7
dum	19.3	69.3	81.7	93.5	5.1	3.1	2.5	1.6	3.0
duo	90.4	95.7	99.1	100.	1.9	1.3	.3	.0	.9
dux	84.6	93.3	99.1	97.8	2.3	1.6	3	.8	1.2
educo	51.8	86.1	90.4	95.7	3.7	2.2	1.9	1.3	2.3
ego	82.0	73.9	94.7	95.7	2.4	2.9	1.4	1.3	2.0
*eo	51.5	67.1	73.0	78.3	3.7	3.1	2.9	2.6	3.1
eques	37.5	37.5	53.0	47.8	4.3	4.3	3.7	3.9	4.0
*et	98.8	98.9	100.	100.	.5	.4	.0	.0	.2
etiam	43.1	78.4	84.3	85.7	4.6	2.6	2.3	2.2	2.8
ex	93.0	98.8	100.	100.	1.6	.4	.0	.0	.5
exercitus	82.6	96.1	97.3	92.4	2.4	1.2	.9	1.7	1.6
*extremus	70.8	86.5	88.6	96.7	3.0	2.2	2.0	1.1	2.1
facilis	80.6	78.0	81.7	92.4	2.5	2.7	2.5	1.7	2.3
facio	88.8	97.8	97.3	100.	2.0	.8	.9	.0	.9
fero	43.1	73.8	91.2	92.4	4.1	2.9	1.8	1.7	2.6
fides	48.2	72.4	85.2	89.1	3.9	2.9	2.3	2.0	2.7
filius	79.2	79.1	93.0	95.7	2.6	2.6	1.6	1.3	2.0
finis	89.9	92.1	100.	98.9	1.9	1.7	.0	.4	1.0
*finitimus	34.4	46.6	53.9	51.0	4.4	3.9	3.7	3.8	3.9
fio	27.2	45.2	46.1	56.5	4.7	4.0	3.9	3.6	4.0
fortis	81.5	84.0	95.6	93.5	2.5	2.3	1.3	1.6	1.9
*fortuna	90.4	98.5	100.	96.7	1.9	.5	.0	1.1	.9
*frater	87.9	93.9	99.1	100.	2.1	1.5	.3	.0	1.0
fuga	56.8	77.3	86.9	88.0	3.5	2.7	2.1	2.1	2.6
gero	77.6	90.0	94.7	94.6	2.7	1.9	1.4	1.4	1.8
gratia	28.8	41.7	73.9	70.7	4.2	4.1	2.9	3.0	3.5
gravis	74.8	79.8	96.5	95.7	2.8	2.6	1.1	1.3	1.9
habeo	89.6	97.8	98.2	98.9	1.9	.8	.7	.4	1.0
hic	86.5	87.9	92.1	95.7	2.2	2.1	1.7	1.3	1.8
homo	82.0	88.6	95.6	96.7	2.4	2.0	1.3	1.1	1.7
hostis	96.3	98.5	100.	97.8	1.2	.5	.0	.8	.6
humilis	42.8	42.7	66.9	66.3	4.1	4.1	3.2	3.2	3.6
iam	50.4	67.1	91.2	93.5	3.8	3.1	1.8	1.6	2.6
ibi	51.2	68.5	73.0	75.0	3.8	3.1	2.9	2.8	3.1
idem	43.7	71.3	92.1	87.0	4.0	3.0	1.7	2.1	2.7
ignis	76.2	87.2	93.0	95.7	2.7	2.1	1.6	1.3	1.9

TABLE VII.—Continued

	Percents Correct				Year Scale Values				Genl. Scale Values
	I	II	III	IV	I	II	III	IV	
ille	70 8	62 1	94.7	90.2	3 0	3 3	1.4	1 9	2 4
*imperium	46 5	80 8	93 0	92 5	3.9	2 5	1 6	1 6	2.4
impero	61 3	88 6	92 1	92.4	3 4	2 0	1 7	1 7	2 2
impetus	50 4	75 5	90 4	88 0	3.8	2 8	1 9	2.1	2.6
*in	94.6	95.3	99 1	100	1.4	1 3	.3	0	.8
incendo	53 2	80.1	97 3	98 9	3.7	2 5	.9	4	1 9
*infero	25 8	60.7	67 8	71.7	4 8	3.4	3 1	2 9	3.6
inuria	60 5	84 7	85 2	91 3	3 4	2 3	2.3	1.8	2.4
*instruo	20 7	54.0	65 2	81.5	5 0	3 7	3 2	2 5	3.6
inter	70 0	94 3	96.5	97 8	3 0	1 5	1.1	8	1.6
ipse	56 3	87 2	96 5	92 4	3 6	2 1	1.1	1 7	2 1
is	74.8	80.8	87.8	94 6	2.8	2 5	2 1	1 4	2.2
ita	54 6	79 5	92 1	90 2	3.6	2 6	1 7	1 9	2.4
iter	69 4	88 0	95 6	92 4	3.0	2 1	1 3	1.7	2 0
iubeo	67 2	90 8	95.6	97 8	3 1	1.8	1 3	8	1.8
latus	70 0	73 5	91.2	93 5	3 0	2 9	1 8	1 6	2 3
locus	84 8	98 2	99 1	100	2 3	.5	.3	0	.8
longus	88 5	91 5	96 5	98 9	2 0	1.8	1.1	4	1.3
lux	52 1	65 3	96.5	98 9	3 7	2 9	1 1	.4	2.0
*magnus	99 4	98 2	100	98 9	.1	.7	0	4	3
maio	14 3	17 6	42 6	41 3	5 4	5 2	4 1	4 1	4 7
malus	81 5	78.1	91.2	88 0	2.5	2 7	1.8	2 1	2 2
manus	74 5	90 4	98.2	100.	2 8	1.9	.7	0	1.3
*mater	97 5	97 9	99.1	100	.9	.8	.3	0	.5
meus	79 2	75 9	90 4	93 5	2 6	2 8	1 9	1 6	2 2
mille	65 0	78 4	94 7	91 3	3.2	2 6	1 4	1.8	2 3
miles	68 9	62 8	70 5	78 3	3 1	3 3	2 7	2.6	2.9
mitto	94 9	96 4	99 1	96 7	1 4	1 1	.3	1 1	1 0
mors	71.4	76 6	88.6	91 3	3 0	2 7	2 0	1.8	2.4
mos	11 5	30 3	46 9	77 2	5 6	4 6	3 9	2.7	4 2
moveo	93 5	96 5	96 5	96 7	1 6	1 1	1 1	1.1	1 2
*multus	45 9	49 4	53 9	58.7	4 0	3.8	3 7	3 5	3.8
munio	71.1	80 9	86.9	81 5	3 0	2.5	2 1	2.5	2 5
murus	85 4	90 4	97 3	96 7	2 2	1.9	.9	1 1	1.5
nam	35 0	75 9	87.8	89 1	4 4	2.8	2 1	2 0	2 8
navis	85 7	95 0	91.2	92.4	2.2	1.4	1.8	1 7	1 8
*ne	60 8	81 5	82 6	87 0	3.4	2.5	2.4	2.1	2 6
nemo	40 9	62 1	85.2	87 0	4 1	3 3	2 3	2 1	3 0
neque	48 7	83 7	95 6	92 4	3 8	2.3	1.3	1.7	2 3
nil	72 0	82 6	96.5	97 8	2 9	2 4	1 1	8	1.8
nisi	16 5	45 2	85.2	91.3	5 2	4 0	2 3	1.8	3.3
nomen	59 9	84 7	95.6	97 8	3.4	2.3	1.3	.8	1.9
non	97 4	97 1	100	92 4	2 1	1 0	0	1 7	1 2
noster	68.0	86 0	94 7	91.3	3.1	2 2	1.4	1.8	2 1
novem	54 9	43 4	62 6	79.3	3.6	4 0	3.3	2 6	3 4
novus	46 5	66 0	89 5	93.5	3.9	3 2	1 9	1 6	2.7
*nox	62 4	86 5	100.	100.	3 3	2 2	0	0	1 4
nullus	50 1	79.4	92.1	92 4	3 8	2 6	1 7	1 7	2 4

TABLE VII.—Continued

	Percents Correct				Year Scale Values				Genl. Scale Values
	I	II	III	IV	I	II	III	IV	
nunc.....	42.6	48.7	93.0	97.8	4.1	3.8	1.6	.8	2.6
nuntius.....	65.5	77.3	90.4	83.7	3.2	2.7	1.9	2.3	2.5
ob.....	12.9	25.1	50.4	62.0	5.5	4.8	3.8	3.3	4.4
*occupo.....	86.0	95.0	93.0	96.7	2.1	1.4	1.6	1.1	1.6
omnis.....	89.3	97.1	100	98.9	2.0	1.0	0	.4	.8
oppugno.....	79.5	94.6	93.9	94.6	2.6	1.4	1.5	1.4	1.7
opus.....	50.7	78.0	86.9	83.7	3.8	2.7	2.1	2.3	2.7
pars.....	77.6	91.0	92.1	93.5	2.7	1.8	1.7	1.6	1.9
parvus.....	92.1	92.8	99.1	97.8	1.7	1.6	.3	.8	1.1
*pater.....	96.6	96.7	100	100	1.0	1.1	0	0	.5
patior.....	12.0	24.7	61.7	63.0	5.5	4.8	3.4	3.3	4.3
pauci.....	66.4	86.8	96.5	97.8	3.2	2.1	1.1	.8	1.8
pax.....	68.3	77.7	92.1	94.6	3.1	2.7	1.7	1.4	2.2
per.....	73.9	87.5	96.5	98.9	2.9	2.1	1.1	.4	1.6
periculum.....	86.5	96.4	100	98.9	2.2	1.1	0	.4	.9
pervenio.....	47.3	81.9	79.9	80.4	3.9	2.4	2.6	2.5	2.9
peto.....	57.1	83.0	93.9	92.4	3.5	2.4	1.5	1.7	2.3
pono.....	55.7	68.1	86.9	92.4	3.6	3.1	2.1	1.7	2.6
populus.....	94.9	97.8	99.1	98.9	1.4	.8	.3	.4	.7
possum.....	81.8	91.1	98.2	96.7	2.5	1.8	.7	1.1	1.5
*posterus.....	22.4	49.1	60.8	59.8	4.9	3.8	3.4	3.4	3.9
post.....	79.0	90.7	92.1	95.7	2.6	1.8	1.7	1.3	1.8
praesum.....	29.1	52.6	66.9	64.1	4.6	3.7	3.2	3.4	3.7
primus.....	93.0	97.8	99.1	100	1.6	.8	.3	.0	.7
princeps.....	71.4	76.6	87.8	91.3	3.0	2.7	2.1	1.8	2.4
pro.....	52.6	70.6	85.2	91.3	3.7	2.8	2.3	1.8	2.7
proelium.....	90.2	98.1	98.2	98.9	1.9	.4	.7	.4	.9
proficiscor.....	41.7	77.3	80.8	82.6	4.1	2.7	2.5	2.4	2.9
puer.....	98.6	96.4	96.5	98.9	.5	1.1	1.1	.4	.8
pugno.....	95.2	98.8	100	97.8	1.3	.4	0	.8	.6
quam.....	56.0	59.3	71.3	71.7	3.6	3.2	3.0	3.0	3.2
quartus.....	55.7	74.5	74.7	91.3	3.6	2.8	2.8	1.8	2.8
quattuor.....	75.6	76.2	78.2	94.6	2.8	2.7	2.6	1.4	2.6
que.....	45.9	68.5	62.6	80.4	4.0	3.1	3.3	2.5	3.2
qui.....	68.6	89.7	97.3	97.8	3.1	1.9	.9	.8	1.7
quis.....	68.6	51.5	69.5	80.4	3.1	3.7	3.0	2.5	2.8
quisquam.....	11.8	25.4	47.8	46.7	5.6	4.8	3.9	3.9	4.5
quisque.....	15.4	28.2	32.2	40.2	5.3	4.7	4.5	4.2	4.7
*quod.....	62.7	89.0	88.6	94.6	3.3	1.9	2.0	1.4	2.2
recipio.....	55.2	81.5	94.7	93.5	3.6	2.5	1.4	1.6	2.3
regnum.....	70.3	83.3	89.4	95.7	3.0	2.4	1.9	1.3	2.1
relinquo.....	55.7	65.7	90.4	96.7	3.6	3.2	1.9	1.1	2.4
res.....	77.0	87.2	99.1	92.4	2.7	2.1	.3	1.7	1.7
rogo.....	25.5	59.3	86.9	93.5	4.8	3.5	2.1	1.6	3.0
saepe.....	86.5	81.5	100	95.7	2.1	2.5	0	1.3	1.5
satis.....	29.1	72.0	92.1	93.5	4.6	2.9	1.7	1.6	2.7
scio.....	41.4	58.2	93.0	95.7	4.1	3.5	1.6	1.3	2.6
secundus.....	87.9	93.5	94.7	94.6	2.1	1.6	1.4	1.4	1.6

TABLE VII.—Continued

	Percents Correct				Year Scale Values				Genl. Scale Values
	I	II	III	IV	I	II	III	IV	
*sed.....	94.1	97.8	100.	100.	1.5	.8	0	0	.6
senatus.....	54.9	86.5	90.4	93.5	3.6	2.2	1.9	1.6	2.3
sequor.....	54.9	83.0	95.6	100.	3.6	2.4	1.3	0	1.8
servus.....	92.4	91.4	93.0	82.6	1.7	1.8	1.6	2.4	1.9
si.....	73.9	95.7	98.2	100	2.9	1.3	.7	0	1.2
signum.....	91.8	98.8	98.2	96.7	1.7	.5	.7	1.1	1.0
similis.....	82.0	91.4	97.3	98.9	2.4	1.8	.9	.4	1.4
sine.....	54.6	80.5	97.3	96.7	3.6	2.5	.9	1.1	2.0
solus.....	66.6	65.0	87.8	93.5	3.1	3.2	2.1	1.6	2.5
spes.....	53.2	87.9	98.2	100.	3.7	2.1	.7	0	1.6
*sui.....	35.6	54.0	71.3	64.1	4.3	3.7	3.0	3.3	3.6
sum.....	78.1	84.4	97.3	94.6	2.7	2.3	.9	1.4	1.8
supero.....	71.7	80.1	93.0	84.8	2.9	2.5	1.6	2.3	2.3
*superus.....	32.3	58.2	58.2	65.2	4.5	3.5	3.5	3.2	3.7
suus.....	51.2	60.0	78.2	81.5	3.8	3.4	2.6	2.5	3.1
tam.....	46.5	45.9	74.7	69.6	3.9	4.0	2.8	3.0	3.4
tamen.....	46.2	75.2	85.2	82.6	3.9	2.8	2.3	2.4	2.8
tantus.....	31.6	65.7	83.4	87.0	4.5	3.2	2.4	2.1	3.0
telum.....	85.7	95.3	97.3	98.9	2.2	1.3	.9	.4	1.2
tempus.....	69.7	86.5	97.3	97.8	3.0	2.2	.9	.8	1.7
teneo.....	63.3	92.5	98.2	98.9	3.3	1.7	.7	.4	1.5
tertius.....	58.0	88.2	97.3	98.9	3.5	2.0	.9	.4	1.7
timeo.....	75.0	91.8	98.2	100.	2.8	1.7	.7	0	1.3
totus.....	60.9	82.4	71.9	78.4	3.4	2.4	2.9	2.6	2.8
*trado.....	25.2	39.2	44.3	41.3	4.8	4.2	4.0	4.1	4.3
tres.....	88.8	89.3	91.2	97.8	2.0	2.0	1.8	.8	1.7
tu.....	66.1	78.0	96.5	98.9	3.2	2.7	1.1	.4	1.8
tum.....	32.2	53.7	76.5	90.2	4.5	3.7	2.7	1.9	3.2
tuus.....	63.3	65.7	94.3	91.3	3.3	3.2	1.5	1.8	2.4
ubi.....	76.7	78.4	85.2	89.1	2.7	2.6	2.3	2.0	2.4
ullus.....	23.5	40.9	66.9	83.7	4.9	4.2	3.2	2.3	3.6
*ulterior.....	19.3	49.8	61.7	51.0	5.1	3.8	3.4	3.8	4.0
undique.....	22.7	64.6	65.2	69.6	4.9	3.2	3.2	3.0	3.6
*unus.....	97.7	97.8	100.	100	.8	8	0	0	.4
urbs.....	97.4	95.3	100.	98.9	.9	1.3	0	.4	.7
ut.....	79.8	93.5	95.6	95.7	2.6	1.6	1.3	1.3	1.7
vasto.....	70.0	88.1	83.4	82.6	3.0	2.0	2.4	2.4	2.5
venio.....	89.9	93.9	99.1	97.8	1.9	1.5	.3	.8	1.1
vereor.....	30.2	55.1	72.1	68.4	4.6	3.6	2.9	3.1	3.6
via.....	93.8	93.5	98.2	98.9	1.5	1.6	.7	.4	1.0
*video.....	95.2	97.8	100.	100.	1.3	.8	0	0	.5
vinco.....	67.2	74.8	95.6	92.4	3.1	3.0	1.3	1.7	2.3
vir.....	97.4	96.7	98.2	98.9	.9	1.1	.7	.4	.8
virtus.....	80.1	84.0	86.0	100.	2.5	2.3	2.2	0	1.8
vis.....	50.7	72.7	89.5	95.7	3.8	2.9	1.9	1.3	2.5
vita.....	66.6	73.1	93.0	97.8	3.2	2.9	1.6	.8	2.1
volo.....	65.8	89.3	96.5	95.7	3.2	2.0	1.1	1.3	1.9
					735.2	566.3	398.0	361.3	513.9

The method of determining the scale values for each year is that briefly described above for the first year test. The procedure may be illustrated as follows: *ab* was correctly translated by 331 out of 357 first year pupils, or, 92.7 percent. The P. E. equivalent on the base line of a normal surface of frequency is -2.155 P. E.⁴ This value subtracted from -3.8 P. E. gives 1.645 or 1.6 the scale value assigned to it for the first year. In the second year *ab* was given correctly by 276 out of 283 pupils. The P. E. equivalent is -2.905 P. E., which subtracted from -3.8 P. E., gives .895, or .9 the assigned value. This procedure was carried out for each of the words and for each year. The sum of the values for each year appears at the foot of the Table. If the entire list of words is used with first year pupils then a perfect score would be 735.2. Toward this score for a correct translation of *ab* the pupil would receive 1.6. If the list is given to second year pupils the perfect score would be 566.3 and toward this score for a correct translation of *ab* he would receive .9.

If the selected list of 200 words is used then the average scores and the sum of the scale values would be as follows:

	I	II	III	IV	...
Averages	130	156	177	181	
Sum of Scale Values	621 9	479 4	330 6	297 4	430 7

The determination of the general or average scale value is somewhat more troublesome. The method employed is that described in detail by Buckingham.⁵ It is necessary to discover the size of the intervals between the medians of the different years. This involves determining the amount and percent. of overlapping between the different years. Some first-year pupils reach or exceed the median ability of the second-year pupils, a smaller number that of the third year and a still smaller number that of the fourth year. The following Table VIII sets forth the facts.

The table reads as follows: Among first-year pupils there were 50 or 14.1 percent who reached or exceeded the median of the second-year pupils, the P. E. equivalent being $+1.595$ P. E. There were 18 first-year pupils, or 50 percent, who reached or

⁴ See Table of P. E. Values corresponding to Given Percents of the Normal Surface of Frequency, Buckingham, op. cit., p. 116.

⁵ Op. cit., pp. 31-40. Also BUCKINGHAM—*Notes on the Derivation of Scales in School Subjects*. Fifteen Yearbook of the Nat. Soc. for the Study of Education, Part I, 1916, pp. 33-40.

TABLE VIII.

Number and Percent of Pupils Reaching or Exceeding the Median in Every Other Year

	I	II	III	IV
I. No.	50	18	11	
Percent	14 1	5 0	3 1	
P. E.	+1 595	+2.439	+2 767	
II. No.	234	64	49	
Percent	82.7	22.6	17 3	
P. E.	-1 397	+1 115	+1 397	
III. No.	114	95	44	
Percent	99 1	82 6	38 3	
P. E.	-3.506	-1 391	+ .441	
IV. No.	90	80	62	
Percent	97 8	86 9	67 4	
P. E.	-2 986	-1 663	— .669	

exceeded the median ability of the third-year pupils, the P. E. equivalent being +2.439 P. E. From this table it is possible to determine various direct and derived values for the intervals between the first-year median taken as a point of reference and the other years. For example there are various values for the interval or median distance between the first year and the second year in terms of units of P. E. The distance between the first-year and the second year is directly represented by two values 1.595 and 1.397, two other derived values are obtained by subtracting from the distance between the first and third year medians the distance between the second and third year medians and this same distance expressed negatively, viz., 1.324 and 2.115, two other derived values by subtracting from the distance between the first and fourth year medians, the distance between the second and fourth year medians and also this distance expressed negatively, viz., 1.370 and 1.323. Other derived values are possible, but these six were regarded as sufficient for determining the distances between the medians. The average value for the interval between the first year and the second year is 1.521. This average gives the same value to all the measures of the intervals, direct and derived. The intervals obtained directly are more reliable than those obtained indirectly. These were given a weight of 6 and the other two involving a skipping of one or two medians were weighted 4 and 2, respectively. The weighted average then becomes 1.541. Carrying this method out for each year the intervals between the years are as follows:

$$\begin{array}{l} M_1 - M_2 \\ 1.541 \text{ P. E.} \end{array}$$

$$\begin{array}{l} M_2 - M_3 \\ 1.281 \text{ P. E.} \end{array}$$

$$\begin{array}{l} M_3 - M_4 \\ .465 \text{ P. E.} \end{array}$$

When referred to the first year median the median distance between it and the third and fourth years are:

$$\begin{array}{l} M_1-M_3 \\ 2.821 \text{ P. E.} \end{array}$$

$$\begin{array}{l} M_1-M_4 \\ 3.287 \text{ P. E.} \end{array}$$

The intervals between the various years being known, all that is necessary to do to determine the general scale value is to add to the P. E. value for the first year the intervals at which the medians of each year stand above the first year. The average of the values thus obtained gives the average position of the word. The method is illustrated for two words as follows:

	I	II	III	IV
	P. E.	P. E.	P. E.	P. E.
<i>ab</i>	2.155	2.905	2.857	3.395
<i>acer</i>	.922	.727	1.602	2.245

When referred to the first year median as the point of reference, by adding to the second, third and fourth year P. E.s the interval between the medians 1.541, 2.822 and 3.287, respectively, and averaging the positions we get the following:

	P. E.	P. E.	P. E.	P. E.	Average Position
	I	II	III	IV	
<i>ab</i>	-2.155	-1.364	-.035	-.108	-.915
<i>acer</i>	-.922	+.814	+1.220	+1.042	+.538

Thus far the procedure in scaling the words is identical with that of Buckingham. The average position when referred to the first year median as the point of reference, however, because of the fact that there were many very easy words in the list would give a scale with — and + values. To rid the scale of the minus values, I planned to use as point of reference, not the first year median, but the position of the easiest word in the list. This is *et* with an average position —1.673. Inability to give the meaning of *et* is pretty close to the zero point in ability in Latin. The easiest word for the first year pupils, however, is *magnus* and for second year pupils *cum*. No word was translated correctly by all first and second year pupils. There were some words that were correctly translated by all third and fourth year pupils and the scale values are undetermined. A point of reference below the position of *et* was arrived at as follows: The arbitrarily assumed zero point for each year indicated above is —3.8. P. E. On the scale this would be the position occupied by a word which would be translated correctly by 995 out of 1000

pupils. When this position for each year is referred to the first year median by adding as before 1.541, 2.822 and 3.287 respectively, we get:

—3.8	P. E. for the first year
—2.259	P. E. " " second year
— .978	P. E. " " third year
— .513	P. E. " " fourth year

Av. 1.887

The average position thus obtained is —1.887, which was taken as the point of reference. The position of the easiest word *et* —1.673 then by subtraction from —1.887 is +.214 or .2 the assigned value. *Ab* with an average position —.915 when referred to this point of reference has an assigned value of +.972 or 1.0. *Acer* with an average position +.538 when so referred gets a value of +2.425 or 2.4. This procedure which has the effect of averaging the positions of the words for the four years was carried out for all the words and is the basis for the general scale value indicated in Table VII.

The general scale value is an attempt to determine the variation in the difficulty of each word or the weight to be assigned to it, regardless of the year or grade. Practically, the year scale values will perhaps be more useful than the general scale value, for after all, our measurements of ability in Latin vocabulary will be of pupils who have had one, or two, or three or four years of Latin and the uses of the measurements will be to compare pupils, classes and schools under these conditions.

There were certain words that were not missed in either the third or the fourth years and a few that were not missed by any third and fourth year pupils. The P. E. equivalents in these years are of course indeterminate. In order to give these words a position in the general scale, it was necessary to assign them some value. The assumption was made that if more pupils had been tested, they would have been missed by five out of a thousand pupils, and the P. E. equivalent —3.8 was arbitrarily assigned to each of them. No attempt was made to vary this value on a basis of the behavior of the words in the first two years.

The list of words may be used in various ways: the entire list may be given and valuable comparison made with performances in typical high schools without regard to the scale values; better would be the use of the 200 words not starred without the scale

values; still better would be to give the entire list or the selected list and assign the weights given in Table VII, using either the general scale values, or the year scale values.

There are, however, two uses which may be made of the data which will be practically valuable: (1) A selection may be made of a smaller list of words, having the same, or approximately the same, scale values, which may then be disregarded. A selected list of twenty-five such words is given below. The words selected are those which decrease in difficulty progressively by fairly uniform steps, from the first year on. They are not too difficult for first year pupils, nor too easy for fourth year pupils. Such a list ought to be of use for many testing purposes.

Selected List of 25 Words and Scale Values

	I	II	III	IV	Average
accipio	3 2	2 6	2 0	1.4	2 3
adventus	3.9	2 4	1.9	1.3	2 4
appello	4 3	2 7	1 9	1.6	2 6
apud	3 4	2.1	2 0	1 1	2 1
caput	2 8	2.6	1.8	1 3	2.1
certus	4 5	3.2	2 3	2 0	3 0
cur.	3 3	3.0	1 7	1 4	2 4
dum	5 1	3 1	2.5	1 6	3.0
educō	3 7	2 2	1 9	1 3	2 3
ignis	2 7	2 1	1 6	1 3	1 9
is.	2 8	2.5	2 1	1 4	2.2
latus	3 0	2 9	1 8	1.6	2 3
mors	3 0	2 7	2.0	1 8	2 4
novus	3 9	3 2	1 9	1 6	2 7
pax	3 1	2.7	1 7	1 4	2 2
post	2.6	1 8	1 7	1 3	1 8
princeps	3 0	2 7	2 1	1 8	2 4
pro	3 7	2.8	2 3	1.8	2 7
regnum	3 0	2 4	1 9	1 3	2 1
relinquo	3 6	3 2	1 9	1 1	2 4
rogo	4 8	3 5	2.1	1 6	3 0
suus	3 8	3 4	2 6	2 5	3 1
tantus	4 5	3 2	2 4	2 1	3 0
tum	4 5	3 7	2 7	1 9	3 2
vis.	3 8	2 9	1.9	1 3	2 5

With this list standard scores in terms of numbers and percents correct would be as follows:

	I	II	III	IV
Number correct	13 7	18 6	22 0	22.6
Percents correct	54.8	74 3	88.0	90.4

(2) The list of 200 words may be subdivided into alternative lists of equal difficulty. Such an arrangement appears in four lists A, B, C, and D with the words arranged in order of difficulty and the corresponding scale values.

Latin Vocabulary Test

A		B		C		D	
bellum	.4	cum	4	castra	5	ex	.5
populus	.7	duco	7	pugno	.6	hostis	.6
primus	.7	urbs	7	auxilium	.8	vir	.8
facio	.9	locus	.8	omnis	.8	puer	8
duo	9	audio	9	annus	.9	proelium	.9
dico	1 0	decem	1 0	ab	1 0	periculum	1 0
finis	1 0	habeo	1 0	via	1 0	mitto	1 0
ante	1 1	parvus	1 1	venio	1 1	signum	1 0
moveo	1 2	dux	1 2	amicus	1 2	ad	1 2
non	1 2	si	1 2	telum	1 2	de	1 3
timeo	1 3	manus	1 3	manus	1 3	longus	1 3
dies	1 5	deus	1 5	similis	1 4	capio	1 4
murus	1 5	possum	1 5	saepe	1 5	teneo	1 5
exercitus	1 6	corpus	1 6	cognosco	1 6	atque	1 6
apes	1 6	secundus	1 6	per	1 6	inter	1 6
tertius	1 7	tempus	1 7	oppugno	1 7	homo	1 7
res	1 7	qui	1 7	ut	1 7	tres	1 7
hic	1 8	gero	1 8	do	1 8	centum	1 8
post	1 8	pauci	1 8	navis	1 8	rubeo	1 8
virtus	1 8	tu	1 8	sum	1 8	sequor	1 8
nihil	1 8	difficilis	1 9	fortis	1 9	gravis	1 9
servus	1 9	pars	1 9	nomen	1 9	ignis	1 9
ego	2 0	animus	2 0	volo	1 9	incendo	1 9
filius	2 0	iter	2 0	lux	2 0	sine	2 0
vita	2 1	apud	2 1	caput	2 1	ipse	2 1
malus	2 2	meus	2 2	noster	2 1	regnum	2 1
is	2 2	impero	2 2	pax	2 2	accipio	2 3
mille	2 3	latus	2 3	facilis	2 3	educo	2 3
neque	2 3	peto	2 3	senatus	2 3	supero	2 3
adventus	2 4	acer	2 4	recipio	2 3	vinco	2 3
altus	2 4	consilium	2 4	iniuria	2 4	ille	2 4
cur	2 4	ita	2 4	mors	2 4	nullus	2 4
princeps	2 4	relinquo	2 4	tuus	2 4	ubi	2 4
ager	2 5	munio	2 5	nuntius	2 5	solus	2 5
appello	2 6	fero	2 6	vis	2 5	vasto	2 5
iam	2 6	nunc	2 6	pono	2 6	quattuor	2 6
celer	2 7	acies	2 7	scio	2 6	fuga	2 6
fides	2 7	idem	2 7	novus	2 7	impetus	2 6
opus	2 7	pro	2 8	satis	2 8	etiam	2 8
nam	2 8	quis	2 8	tamen	2 8	totus	2 8
miles	2 9	pervenio	2 9	profiscor	3 0	convenio	3 0
rogo	3 0	meus	3 0	certus	3 0	dum	3 0
ibi	3 1	diu	3 1	suus	3 1	alius	3 2
tum	3 3	nisi	3 3	que	3 2	quam	3 2
aliquis	3 4	debeo	3 4	alter	3 4	novem	3 4
deligo	3 6	humilis	3 6	gratia	3 5	tam	3 4
ullus	3 6	undique	3 6	veroer	3 6	conicio	3 7
praesum	3 7	discedo	3 7	fio	4 0	eques	4 0
ulterior	4 0	conficio	4 1	mos	4 2	pator	4 3
quisque	4 7	malo	4 7	quisquam	4 5	ob	4 4
	107 7		107 9		107 5		107 6

The second point of attack in developing standard tests for Latin is to secure a measure of ability to translate not isolated words, but words as they occur in sentences. A sentence test to be of value should not contain words with which the pupil has not come in contact. One of the main purposes of the study of vocabularies was to secure materials for the construction of sentences which could fairly be used to test any high school pupil who had studied Latin for a year or more. Results with this test will be reported in the December issue of this JOURNAL.