FACTOR ANALYSIS OF A FORCED-CHOICE RATING SCALE

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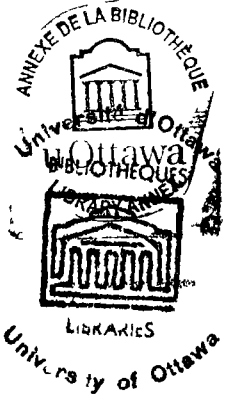

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CURRICULUM STUDIORUM

George Gordon Henderson, priest of the Society of Jesus, was born on October 7, 1917, in Charleroi, Pennsylvania. He received the degree of Bachelor of Arts from Georgetown University, Washington, D.C., in 1941. He received the degree of Licentiate in Philosophy from Weston College, Weston, Massachusetts, in 1945. In the same year, he received the degree of Master of Arts in Philosophy from Boston College, Boston, Massachusetts. The title of his thesis was Some Psychological Aspects of Aristotle's Theory of the Function of Tragedy. In 1949, he received the degree of Licentiate in Sacred Theology from Woodstock College, Woodstock, Maryland. In 1950, he received the degree of Master of Education from Boston College. The title of this thesis was A Proposed Revision of the Elementary Greek Syllabus of a Group of Jesuit Schools.

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INTRODUCTION

Since the inception of formal education, educational institutions have felt the need of a suitable method for selecting students. Schools, at all levels, soon learned from experience that not all pupils were equally suited and ready for formal education. Early American institutions of higher learning, where a small student body and a rigidly defined curriculum was the rule, were long satisfied with a personal interview with the applicant to determine whether or not he should be admitted. School officials felt that a good character and successful mastery of the rudiments of Latin and Greek were sufficient guarantee of successful work in college. That these two aspects of the applicant could be judged in an interview seemed commonly accepted by widespread usage.

If one studies the origins of American colleges, their early admission policies are easily understood. For the most part, colleges in the United States, even after the colonial period, were institutions conducted under Church sponsorship. The primary aim of these schools was to produce an educated clergy. With a dedication so specific, colleges were not swamped by large numbers of applicants and college officials could give their leisurely and personal attention to each applicant.

With an increase in the number of applicants for college, it became impossible for a single college official to interview personally each candidate. The growing complexity of the courses offered by the colleges made an examination in classical Latin and Greek pointless. The two above-mentioned factors - increased enrollment and a wider course offering - necessitated more flexible and more objective criteria for the selection of college students. During the last half of the nineteenth century, admission policies of American schools changed greatly. Objective standards took the place of personal and, at times, haphazard methods of examining candidates.[1]

The tremendous increase of applicants for American colleges after the second world war made it most imperative that an efficient method of selecting students be secured to screen applications of large numbers of potential students, applying from widely divergent geographical sections of the country. The largest enrollment prior to the fall of 1946 was in 1939 when there were 1,365,000 students in American colleges and universities. In 1946 there were 2,078,000 so enrolled.[2] In 1955, the United

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1 Benjamin Fine, Admission to American Colleges, New York, Harper and Brothers, 1946, p. 14.

2 William A. Jaracz, Fall Enrollment in Higher Educational Institutions, 1954, Circular No. 419, U. S. Department of Health, Education and Welfare, Washington, Government Printing Office, 1955, p. 3.

States Bureau of the Census reported that approximately 1.7 per cent of the entire American population was enrolled in institutions of higher learning whereas only .25 per cent had been enrolled at the close of the last century.[3]

With such increased applications, it is not surprising that college entrance officers turned more and more to objective tests to aid them in selecting students. A study in 1946 showed that 90% of American colleges and universities were using tests for guidance and placement purposes after admission while a growing number of such institutions were using test batteries for selection of their students.[4] The tests most commonly used are psychological, placement, general aptitude, reading, English and mathematics.

In spite of the present widespread use of tests, colleges are not willing to rely upon them exclusively in selecting their students. Previous scholastic achievement is considered of prime importance. Many require letters of recommendation, autobiographical essays, etc. It would seem that a college admission technique that would consider together the applicant's high school rank, his achievement

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[3] U.S. Bureau of the Census, Current Population Reports, Series P - 25, No. 118, Washington, Government Printing Office, 1955.

[4] Fine, Op. cit., p. 102.

in objective high school content examinations, his performance on a general aptitude test and his personality would predict with some reliability the individual's probable achievement in college.

The fact remains, however, that despite all efforts, there still remain a number of students who have satisfied all entrance criteria but who are in fact unsuccessful in college. Hence the search for a better instrument for selecting college students goes on.

Dr. Paul Lilly, then an instructor in psychology at Keystone Junior College in La Plume, Pennsylvania, devised a student description sheet which was in reality a forced-choice rating scale. Although this scale was directly intended to evaluate the students then enrolled at Keystone, still the author intended his study as a first step toward the construction of an instrument which could be used as part of a college entrance battery. Lilly assumed that his scale would measure factors not already measured in the ordinary entrance battery. If this assumption proved to be true, and the factors measured were related to college achievement, then the inclusion of this scale in a college entrance battery would add to the predictability of the battery.

Subsequent validation studies, which will be investigated in Chapter II, show that Lilly's scale is a valid

and probably reliable predictive measure of college success.

The present study seeks to investigate the assumption that this scale is measuring something not already being measured in a typical college entrance battery. Specifically, answers to the following three questions are sought:

(1) What in fact does Lilly's forced-choice scale measure?

(2) Are the traits measured by Lilly's scale different from those measured by the other college entrance tests?

(3) If the factors measured by both the forced-choice scale and the other tests are similar, is there evidence to indicate that the forced-choice scale given added, significant predictability to a college entrance battery by its inclusion?

To seek the answer to the above three questions, a multiple factor analysis of Lilly's scale and a typical college entrance battery will be undertaken.

The first section of this report will be devoted to a brief review of the literature on the forced-choice technique. It will indicate the selection problems which inspired the development of the technique.

The next portion of the discussion will concern itself with a description of the work of Lilly in the construction of his scale, the later validation study and the subsequent item-analysis and revision of the scale.

A description of the procedures followed in this study will be followed by a report of results of the factor analysis. This discussion will evaluate independent predictive value of Lilly's scale when included in a college entrance battery.

Promising topics for further research will be indicated. An appendix will present Lilly's original scale and its revisions, as well as the pertinent data necessary to an understanding of the factor analysis.

CHAPTER I

REVIEW OF THE LITERATURE I: FORCED-CHOICE TECHNIQUE

1. Theory of Forced-Choice Technique.

The forced-choice rating method was developed in an attempt to avoid the leniency error and the halo effects felt to be common to most rating scales. Travers[1] reports that a forced-choice theory was suggested by Horst and an instrument first constructed by Wherry. The forced-choice scale can be described as a measurement device in which the items have been matched for preference value, yet have the ability to discriminate differentially in a specified situation. An example of a forced-choice item[2] follows:

____ ____ Rates excessively.

____ ____ Needs little guidance.

____ ____ Doesn't know opinion from fact.

____ ____ Inclined to be deep, intellectual.

The descriptions "Needs little guidance" and "Inclined to be deep, intellectual" were found to have equal preference value because they were used almost equally often

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1 R. M. W. Travers, "A Critical Review of the Validity and Rationale of the Forced-Choice Technique", in The Psychological Bulletin, Vol. 48, No. 1, 1951, p. 62-70.

2 Paul J. Lilly, University of Scranton Student Description Sheet, Scranton, Pennsylvania, 1958, Item 7. See Appendix 4, p. 83.

as favorable descriptions. The description "Inclined to be deep, intellectual", however, was found to be valid since it was applied significantly to the high criterion group more frequently than to the low criterion group.

The descriptions "Rates excessively" and "Doesn't know opinion from fact" were found to be almost equally unpopular, but the latter discriminated the low from the high criterion group.

Although there are several forms into which this rating technique has developed, forced-choice scales fundamentally consist of a method of presenting the rater with a series of personal traits and "forcing" him to choose several which either best describe the individual being rated, or which describe the ratee least, or which describe the ratee both best and least.

The assumption is that the tendency of the rater to give too high or too low a rating will be counteracted and a truer picture of the individual will emerge. Essential to the technique is the inclusion of items which have no discriminative value although they are said to have high preference value, i.e., they are used frequently in describing the individuals being rated but they do not correlate significantly with the criterion. These irrelevant traits serve to depress the rater's personal biases and, also, it is assumed that these "suppressor variables"

tend to give a more objective picture of the individual rated. Guilford explains rather well this suppression feature of the technique as follows:

> [...] if the rater is dominated by a desire to make the ratee look good and to avoid making him look bad, in using an ordinary check-list device he could check a large number of favorable traits and avoid checking unfavorable ones, thus piling up a good looking score. In the forced-choice device, however, it is thought that under the same kind of set the rater is likely to mark the irrelevant traits as often as the relevant ones, since he presumably has no inkling as to which favorable or unfavorable traits receive weights toward the score, and hence the 'suppression' feature.[3]

Guilford[4] points out, however, that there are two important assumptions underlying this technique which must be kept in mind: Irrelevant items will serve as suppressor variables as described above only if 1) they average as high as the relevant items in apparent validity, and will, if 2) the individuals rated have average equal status in the irrelevant qualities.

> If the rater who wants to mark only favorable traits knows nothing concerning the validity of the elements, he is in the position of the heavy-guesser in a true-false test. His scores will be heavily weighted with chance and hence are unreliable.[5]

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3 J. P. Guilford, Psychometric Methods, New York, McGraw-Hill Book Company, 1954, p. 274.

4 Ibid., p. 276.

5 Ibid., p. 276.

The unique features of a forced-choice device are described by Sisson in rating officers in the United States Army:

> Rather than indicating how much or how little of each characteristic an officer possesses, the rater is required to choose, from several sets of four adjectives or phrases, which one best characterizes the officer, and which is least descriptive. In other words, it calls for objective reporting and minimizes subjective judgement. And, because of the way in which the tetrads - sets of four rating elements - are constructed, it reduces the rater's ability to produce any desired outcome by the choice of obviously good or obviously bad traits. It thus diminishes the effects of favoritism and personal bias.[6]

Ferguson[7] distinguishes four basic assumptions underlying the forced-choice technique. They can be briefly summarized as follows:

1. The real difference between one individual rated and another can be described by means of objective, observable traits.

2. These objective, observable traits differ in the extent to which raters tend to use them in describing the individuals rated. (Some are popular and frequent, some are not.)

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6 L. Donald Sisson, "Forced-Choice - the New Army Rating", in Personnel Psychology, Vol. 1, p. 3, 1948, p. 365-381.

7 Leonard W. Ferguson, Personality Measurement. New York, McGraw-Hill Book Company, 1952, p. 320.

3. The objective, observable traits differ from each other in the extent to which they can discriminate among individuals rated with regard to the criterion.

4. Pairs of traits can be selected so that while both have the same preference value (i.e., the possibility of one being more acceptable than another is eliminated) still the traits can differ in discriminative value and so offer a real possibility for choice as to the ratee's being a better or a poorer individual with respect to the criterion.

2. Construction of a Forced-Choice Scale.

Several steps are usually followed in the construction of a forced-choice scale:[8]

1. Essay descriptions of behavioral qualities are obtained of individuals who are recognized by other criteria as better than average and less than average in relation to the group to be rated. These descriptions are then analyzed into simple qualities which are stated in a single word or a short phrase.

2. Two indices for each descriptive phrase or adjective are computed: a discriminative index, determined by an item

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8 S. A. Sandquist, "The Forced-Choice Technique and Rating Scales", in The American Psychologist, Vol. 1, No. 7, p. 267. See also Bisson, Op. cit., p. 769.

analysis, and a preference index, determined by the relative frequency of use.

3. Pairs of phrases or adjectives are selected which seem of equal value to the rater (preference index). Only one member of the pair, however, is valid (discriminative index).

4. An item is formed by assembling two pairs of elements into a tetrad.

5. The scale is tried out experimentally and the items which form the final scale are selected after the resulting validation study.

Although much of the work done with the forced-choice technique has been in the tetrad form, other forms of the scale are in use. Highland and Berkshire report six forms in use:

Form A. Two statements per item, both favorable or both unfavorable; rater selects more (less) descriptive statement.

Form B. Three statements per item, all favorable or all unfavorable; rater selects the most and least descriptive statements.

Form C. Four statements, all favorable; rater selects two most descriptive statements.

Form D. Four statements, all favorable; rater selects the most descriptive and the least descriptive.

Form E. Four statements, two favorable and two unfavorable; rater selects the most and least descriptive.

Form F. Five statements, two favorable, two unfavorable, one neutral; rater selects most and least descriptive.[9]

3. Use of Forced-Choice Scales.

Sisson developed the forced-choice scaling technique while he was employed by the Civil Aeronautics Authority. When he moved to the Personnel Section, Adjutant General's Office, he found a ready application for his device.

The efficiency reports on officers in the United States Army had been plagued for years with halo and leniency effects. Since the future promotion of an officer was felt to depend in large part upon these reports, officers were hesitant to give unfavorable reports except in very extreme cases. This hesitancy increased in

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9 R. W. Highland and J. R. Berkshire, "A Methodological Study of Forced-Choice Performance Rating", in Research Bulletin, Vol. 51, No. 9, 1951, San Antonio, Texas, Human Resources Research Center.

proportion to the rank of the officer being rated. In 1940, with the imminent approach of world war, Bisson reported that:

> Efficiency reports, instead of showing the 150 best, showed only that, of 4,000 ground officers of suitable general officer age, 2,000 were considered superior and best.[10]

In an attempt to discriminate more sharply among the superior officers in the army, a new efficiency report was prepared which contained a forced-choice sub-scale. This initial use of the forced-choice technique by the army seemed to give better results than previous methods of rating.

> The technique, and the form embodying it, has been tried out on fifty thousand officers - in both experimental and official trials - and the results obtained with it have been compared with independent criteria of efficiency arrived at through group ratings. It produces a better distribution of ratings relatively free from the usual pileup at the top of the scale. It is less subject to influence by the rank of the officer rated. It is quickly and objectively scored by machine. And, above all, it produces ratings which are valid indices of real worth.[11]

While the work of devising a new classification technique for the army was going on, Jurgenson[12] was

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10 E. Donald Bisson, On. cit., p. 367.

11 Ibid., p. 366.

12 Clifford E. Jurgenson, "Report on the 'Classification Inventory', A Personality Test for Industrial Use", in Journal of Applied Psychology, Vol. 28, No. 6, 1944, p. 445-460.

independently developing a self-rating personality inventory for use in industry. His Classification Inventory grouped the items in two different ways. In one grouping, three groups of items were presented at once to the testee who was to indicate which was "best", which was "worst" and which was "neither best nor worst". In the second grouping, pairs of items were presented in which the items had similar degrees of preference but had different identifying value. In validating the inventory, thirty graduate students and forty technical salesmen were used. He found a Pearson correlation of .67 to .71 on the graduate students and .77 to .81 on the salesmen. The ratios obtained ranged from 3.3 to 11.5.

A little later, Bittner[13] developed a scale using the forced-choice method to evaluate supervisors at the Owens-Illinois Glass Company. He reported:

> [...] the efficiency of this type of rating scale was compared with the results obtained with two different trait rating scales and a performance check list. The results showed that this new type gave more accurate ratings than any of the others.[14]

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13 Rolph Bittner, "Developing an Industrial Merit Rating Procedure", in Personnel Psychology, Vol. 1, No. 4, 1948.

14 Ibid., p. 430.

Radom[15] reports on the use of the forced-choice technique in the Employee Relations Department of the Standard Oil Company of New Jersey. The method was used in the construction of performance reports for supervisors as well as for the construction of test batteries for the selection of personnel. It was reported that the use of these batteries was more accurate than previously used methods.[16]

Kirkpatrick[17] attempted to use the Jurgenson Classification Inventory as a predictor of the academic achievement of college students. The test was administered to 261 male students. Grade-point average was used as the criterion of scholastic success. While some positive correlation was found between test scores and the criterion, it was not found to be statistically significant to warrant its use as a selection device.

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15 Mathew Radom and others, Made to Measure, New York, Employee Relations Department, Standard Oil Company, 1951.

16 Ibid., p. 7.

17 J. J. Kirkpatrick, "Cross-Validation of a Forced-Choice Personality Inventory", in Journal of Applied Psychology, Vol. 35, No. 6, issue of December, 1951, p. 417.

Gordon[18] administered a questionnaire and forced-choice personality test at a women's college dormitory. Both questionnaire and forced-choice test were of the same factoral structure and contained the same item content. After validation a revised questionnaire and forced-choice test was administered to 63 women and 55 male dormitory students. In both administrations of the questionnaire and the forced-choice test, the forced-choice method was found to be more valid with validity coefficients ranging from .47 to .72.

Staugas[19] developed a forced-choice scale at the University of Illinois to evaluate counselors in 37 student dormitories. The counselor's success was judged in this study by his reputation and the number of dissatisfied counselees. (Obviously a highly subjective procedure. No doubt, too, the ability of the counselor to impress his supervisor favorably was reflected in the supervisor's judgement of his reputation.) Staugas used essentially the same methods as those employed by the army as reported by

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18 L. V. Gordon, "Validities of Forced-Choice and Questionnaire Methods of Personality Measurement", in The Journal of Applied Psychology, Vol. 35, No. 6, issue of December, 1951, p. 407-412.

19 L. W. Staugas, A Forced-Choice Rating of Referral Counselors, unpublished Master of Arts thesis presented to the School of Psychology of the University of Illinois, Urbana, Illinois, 1950.

Sisson and Rundquist. He compared forced-choice ratings with those on a graphic scale and "buddy" rankings. It was found that the forced-choice scale had an r of .69 with graphic ratings and an r of .48 with "buddy" rankings.

4. Criticism of the Forced-Choice Technique.

Since the purpose of the present study is to report the results of a factor analysis of Lilly's forced-choice scale, it would not seem pertinent to discuss in detail the criticism of the technique in general. This has been done already by Lilly[20] and Chappen[21] in their reports. On the other hand, it would seem appropriate to indicate in a general way what has been the criticism of the method to date to obtain a clearer picture of the limitations of this technique with a view toward the overall usefulness of Lilly's scale.

Guilford offers two rather serious criticisms of the forced-choice method. He feels first of all that it has not yet been conclusively shown that the forced-choice scale

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20 Paul J. Lilly, A Forced-Choice Scale for Junior College Students, unpublished Master of Arts thesis presented to the Department of Psychology of the Pennsylvania State College, State College, Pennsylvania, 1953.

21 Dorothea P. Chappen, Validation of a Forced-Choice Rating Scale on University of Scranton Freshmen, unpublished Master of Arts thesis presented to the Department of Education of the University of Scranton, Pennsylvania, 1956.

actually overcomes the biases it was constructed to correct:

> Astute raters can probably decide which of some pairs of matched descriptions are actually more relevant or valid [...] No studies have been made to show how many of the relevant traits raters can detect.[22]

Guilford's second criticism is that the forced-choice technique poses a problem from the point of view of measurement theory.

> The irrelevant descriptions pertain to traits of personality as well as the relevant ones. The judgement of the rater gives a partial rank ordering of four traits within the individual. The scores that are to be derived from such judgements are to represent differences between individuals. Evaluation of traits within a person are a form of measurement that Cattell has called 'ipsative' measurement (9). Measurements expressed in terms of individual differences are 'normative' measurements. The question to be asked here concerning the forced-choice technique is to what extent the ipsative properties of the judgements are carried over into the scoring of individuals. The leptokurtic distribution of scores might be a consequence of this very thing.[23]

With regard to the first criticism, it is difficult to believe that there is not some reduction in the effect of bias in rating by means of the forced-choice technique in the light of the research presented in this chapter. In all the studies presented, except that of Kirkpatrick,

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22 J. P. Guilford, Psychometric Methods, p. 277.

23 Ibid., No. 9 in Guilford's quotation refers to R. B. Cattell, "Psychological Measurement: Normative, Ipsative, Interactive", in Psychological Review, Vol. 51, No. 5, 1944, p. 293.

increased accuracy of rating was reported as a result of the use of the forced-choice method. It should be recalled, moreover, that the proponents of this technique do not assert either a complete disguise of items or a total control of bias. What is claimed is a reduction of errors due to a personal bias.

Guilford's second criticism is a serious one. There is no doubt that the forced-choice device seeks to evaluate traits within a person (ipsative measurement) and, as a result of such evaluation, derive a measure of individual differences in a given population (normative measurement). While this objection may well give pause to a forced-choice theorist at first glance, upon reflection the difficulty would seem to be in part, at least, an apparent one.

It is important to mention here Guilford's objection also to the use of the usual R-technique factor analysis with ipsative scores. Since the present study employs the R-technique, it may be well to consider this objection before attempting to answer the previous one.

The R-technique is the most frequently used type of factor analysis. It is the usual correlation of tests administered at one time to a number of people. It indicates how the tests covary over the persons in the sample. The Q-technique, on the other hand, indicates how two or more persons covary over a number of tests. Guilford

says:

> For the usual factor analysis (R-technique) in which the experimental variables are individual differences, normative scores are properly used. We correlate scores over a population of individuals. When the factor analysis is the Q-technique, in which individuals are correlated, we should use ipsative scores. The scores are then correlated over a population of traits or qualities. It is improper to use normative scores in a Q-technique and to use ipsative scores in an R-technique analysis.[24]

The only conclusion which can be drawn is that ipsative measures should not be factor analyzed by the R-technique. But are scores on a forced-choice scale, after proper validation and item analysis, in reality completely ipsative measures?

While it is true to say that an individual is ranked with regard to the elements, usually four, which make up an item, still scales used for prediction, such as Lilly's which will be considered later, really do something else, namely: indicate whether or not traits related to an outside criterion are present in the individual. Only such traits as can <u>discriminate between individuals</u> are included in such a scale.

Hence the author of a forced-choice scale attempts to transform ipsative scores into real measures of individual differences. Guilford indicates this resolution of the

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[24] J. P. Guilford, "When Not to Factor Analyze", in Psychological Bulletin, Vol. 49, No. 1, 1952, p. 31.

difficulty: "To a large extent the item analysis based on the tetrad items should do much to bridge the gap to normative measurement."[25]

Travers[26] offered a criticism of the rationale and validity of the forced-choice technique as used in the officer selection program of the United States Army.

According to Baier[27] and Richardson[28] Travers was not familiar with all the work done by the Personnel Section of the Adjutant General's office. Unfortunately, all of the data on this work have not yet been published.

If the review of the literature on the forced-choice technique is to be complete, there must be added a report on the application of this method of rating used in the prediction of college achievement. Such a scale was constructed by Lilly in 1952. Since it is this scale which is the object of the factor analysis presented in this study, Lilly's work will be considered in some detail in the next chapter.

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25 J. P. Guilford, Psychometric Methods, p. 277.

26 R. M. W. Travers, Op. cit., p. 62-70.

27 D. E. Baier, "Reply to Travers' 'A Critical Review of the Validity and Rationale of the Forced-Choice Technique'", in Psychological Bulletin, Vol. 48, No. 1, p. 435-437.

28 M. W. Richardson, "An Empirical Study of the Forced-Choice Technique", in Psychological Bulletin, Vol. 48, No. 1, p. 435-437.

CHAPTER II

REVIEW OF THE LITERATURE II: LILLY'S FORCED-CHOICE SCALE

Lilly's[1] work in constructing and validating a forced-choice scale is presented in this chapter, together with his findings and conclusions.

The additional research done on Lilly's original work, notably a second validation study, an item analysis and a subsequent revision of his scale, is also reported here. It was this revised form of the scale which was used to obtain the data for the factor analysis reported in this study. Hence the importance of describing in some detail the steps which led to its construction and validation.

1. The "Keystone Student Description Sheet".

Lilly attempted to apply the forced-choice technique as reported by Sisson, Sundquist, Lehmann and others to the task of rating college students. His work was carried on at Keystone Junior College, La Plume, Pennsylvania. By means of his rating scale, derived from meaningful behavior traits, obtained in a manner which will be described presently, Lilly attempted to rate the student

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1 Paul J. Lilly, A forced-choice rating scale for Junior College Students, unpublished master of Arts thesis presented to the Department of Psychology, Pennsylvania State College, State College, Pa., 1943, p. 11.

body at Keystone at the end of the scholastic year for the purposes of recommendations for employment or further academic work.[2]

a) Population - The subjects used in Lilly's study were 150 students, approximately 95% of the student body of Keystone Junior College. The subjects were divided into two groups in order to provide a sample for cross-validation. The freshman and sophomore classes were divided in half by arranging the classes in alphabetical order and placing the "odds" in one group and the "evens" in another. One half of the freshman class so selected was combined with the similarly selected half of the sophomore class to form the validation sample. The remaining group, formed of the second halves of the freshman and sophomore classes, was held out as the cross-validation sample. Table I indicates the composition of the samples according to class and sex.

Lilly made no attempt to match the groups on variables other than class and sex, although the validation and cross-validation samples were comparable in the curricula from which each was drawn.[3]

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2 Ibid., p. 32.

3 Ibid., Tables II and III, p. 34.

Table I.- Distribution of Subjects in Validation and Cross-Validation Groups According to School, Class and Sex.

	Validation Group			Cross-Validation Group			Totals		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Freshman	20	18	38	20	18	38	40	36	76
Sophomore	18	19	37	18	19	37	36	38	74
Totals	38	37	75	38	37	75	76	74	150

Paul J. Lilly, Op. cit., p. 13.

b) Raters - The raters used in the study were the twenty-four faculty and staff members of Keystone Junior College, nineteen men and five women. Four were full-time administrators; four, instructors in business subjects; three, instructors in engineering and mathematics; seven, in liberal arts; three, in science; two, in physical education; and one librarian. The raters were familiar with the students in the classroom and/or in the extra-class activities characteristic of a small coeducational residential college in a rural setting.

c) Criteria - Lilly sought as a criterion for his study a measure of better-than-average and poorer-than-average students. He felt that the traditional grade-point average reflected the student's achievement in various different and highly incomparable curricula and, further, reported academic achievement only. Since he wanted a more complete description of the student, he used the rater's alternate ranking employed successfully by Rados[4] and Richardson.[5]

Alternate ranking is a method of ranking whereby the rater ranks first the highest in a group and then the

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4 Mathew Rados and others, Made to Measure, New York: Employee Relations Department, Standard Oil Company, 1951.

5 W. A. Richardson, "An Empirical Study of the Forced-Choice Performance Report", mimeographed paper presented at the 57th annual meeting of the American Psychological Association, Denver, Colorado. For an abstract of the paper see American Psychologist, Vol. 4, No. 7, 1949, p. 278-279.

lowest; then the next highest, next lowest, etc. Lilly arranged his validation and cross-validation groups in alphabetical order and asked the members of the faculty to rank the highest and the lowest, alternately in each group. Perhaps the process can be more readily understood from the directions given by Lilly to Keystone's faculty members:

> Will you please consider these students with respect to their over-all competence, the effectiveness with which they perform their day to day tasks, their proficiency, their general over-all value. Ask yourself such questions as: Which one of them is the most successful, most competent, most effective, most valuable to the group? Take into account all the elements of successful student performance, such items as scholastic achievement, extra-curricular output, relations with other people, ability to get the work done, intelligence, interest, response to training, and the like. In other words, which one most nearly approximates the ideal, the kind you want more like?
>
> Then indicate your reactions to the group as follows: Study the names and decide which one person 'tops' the list, that is, which one is 'best' or 'highest' in terms of the criterion described above. Draw a line through the name and write it on the top line, the line marked 'highest-1' on the righthand side of the page. Now study the remaining names and decide which one person is 'lowest', that is, which one is poorest or least successful of the group. [...] Draw a line through your selection and write the name on the line at the bottom, the one marked 'lowest-1'. Now select the 'next highest' from the remaining names, draw a line through your selection and write the name on the line marked 'next highest-2'. Then select the name of the person next to the lowest of the group, draw a line through your selection, and write the name on the line marked 'next lowest-2'. Repeat this process, alternating between highest and lowest until all names have been crossed off the lefthand list.[6]

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[6] Paul J. Lilly, Op. cit., Appendix, Form II, p. 2.

The rankings obtained were correlated with the cumulative grade-point average of the students using the rank-difference method of Spearman. Correlations of .79 and .87 were obtained for the two freshman groups and .73 and .74 for the two sophomore groups.

Alternate rankings and grade-point averages were combined into a composite criterion. Both the rankings and raw grade-point average scores were converted into standard scores, with the mean in each group being assigned a standard score of 70 and a standard deviation of 10 points. This made both scores comparable and permitted the averaging of both into one criterion score for each student in each group.

d) Construction of the scale - Lilly, following the steps outlined in Chapter I,[7] asked members of the faculty and students in his psychology classes to write essay descriptions of a specific "better-than-average" and "poorer-than-average" student. After combining and editing the results, 245 items were obtained, half of which were descriptive of "better-than-average" students and half descriptive of "poorer-than-average" students.

Next, this entire list was presented to each member of the faculty with instructions to rate a definite "better-than-average" student known to him and a specific

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7 See p. 5.

Table II.- Calculation of Preference and Discriminative Indices for Item No. 183: "Follows Line of Least Resistance".

Weight	Highest Degree 0	Outstanding Degree 1	Typical Degree 2	Limited Degree 3	Slight or no Degree 4	
Frequency used on "Better than Average"	0	0	3	7	12	
Frequency used on "Poorer than Average"	4	9	6	3	0	
Sum of f	= 4	9	9	10	12	= 44
Sum of f x weight	= 0	9	18	30	48	= 105
Difference BTA[a] - PTA	= 4	9	3	4	12	= 32

Paul J. Lilly, Op. cit., p. 21.

a The letters BTA and PTA are abbreviations for "Better than Average" and "Poorer than Average", respectively.

b Calculation of Preference Index (PI) =

$$\frac{\text{Sum fw}}{n} \times 100 = \frac{105}{44} \times 100 = 239$$

c Calculation of Discriminative Index (DI) =
Sum of differences BTA - PTA = 32

"poorer-than-average" student on a five-point scale. From the information obtained by these ratings, it was possible to compute a preference index and a discriminative index for each item.[8]

In selecting pairs of elements to be used in the subsequent formation of tetrads, Lilly sought to pair those with an identical PI but differing in DI as greatly as possible. Since, however, it was not possible to achieve this ideal, he paired elements with a PI which differed ten units or less and with a DI which differed by at least ten units.

Next, two pairs of elements were united into a tetrad, thus forming an item for the scale. The "poorer-than-average" pairs of elements were arranged in order of descending PI and ranged from PI 332 to PI 229. The "better-than-average" pairs of elements were similarly arranged with a range from PI 230 to PI 182. Each resulting group of thirty-eight pairs was halved and the first pair of elements in the "better-than-average" upper half was combined with the first pair of elements in the "poorer-than-average" lower half, and vice versa. In forming the resulting items - tetrads -, the elements were combined in

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8 Hereafter in the text the letter PI and DI will be used to designate "Preference Index" and "Discriminative Index", respectively.

random order so that no pattern of good or poor elements were indicated.

The resulting thirty-eight tetrads were arranged in a scale called the "Keystone Student Description Sheet".[9] Each faculty member was asked to complete the description sheet for several students in the validation group with whom he was familiar.

For scoring, Lilly assigned a priori weights as follows: In the pair of elements associated with "better-than-average" students, if the element which had the higher DI was checked as being most descriptive of a student, a score of plus one was given; if this element was checked as least descriptive, the score was minus one. Similarly, in the pair of elements associated with "poorer-than-average" students, if the element with the higher DI was checked as least descriptive, a score of plus one was assigned, if checked as most descriptive, the score was minus one. If the non-discriminating element was checked, the score was 0. Thus the scores could range from minus 76 to plus 76, a possible range of 152 points.

e) Validation - When the description sheets had been scored, the raw scores of the validation group (Freshman I and Sophomore I) were correlated with the composite

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9 See Appendix 1, p. 63.

criterion scores by the Pearson rank-difference method. The resulting correlations, r = .61 for Freshman I and r = .65 for Sophomore I, were significant at the one percent level of confidence.

f) Item analysis - An item analysis was based on the upper and lower 27% of the validation sample according to the method described by Kelley.[10] Using Thorndike's[11] criterion of a correlation of .25 or .30 as indicating an outstandingly valid item, fourteen of the original thirty-eight tetrads were retained without change. Twelve tetrads, in which one or several elements did not have the requisite correlation, were changed, substituting elements having the desired correlations. Thus a revised scale of twenty-six items (tetrads) emerged.[12]

g) Cross-validation - The students in the cross-validation sample (Freshman II and Sophomore II) were assigned to faculty members to be rated in the same manner as was the validation sample, using, however, the revised scale of twenty-six items. Coefficients of correlation were found as follows: Freshman II, r = .62; Sophomore II,

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10 T. L. Kelley, "The Selection of Upper and Lower Groups for the Validation of Test Items", in the Journal of Educational Psychology, Vol. 30, No. 1, 1939, p. 17-24.

11 E. L. Thorndike, Personnel Selection, New York, John Wiley and Sons, 1949, p. 247.

12 See Appendix 2, p. 71.

r = .71, both significant at the one percent level of confidence.

h) Reliability - For both validation and cross-validation samples split-half reliabilities were obtained by correlating the raw scores of odd-numbered items with those of the even-numbered items. For the validation group, the coefficients of reliability were .77 (Freshman I) and .95 (Sophomore I) when boosted by the Spearman-Brown prophecy formula. For the cross-validation group, the coefficients were .94 and .93.

i) Conclusions -

> The 26 tetrad final scales - the Keystone Student Description Sheet - appears to be a valid and probably a reliable blank, which when completed by present faculty members at Keystone Junior College on students whom they know from college contacts, seems to bear a significant relationship to scores which represent a composite of academic achievement and overall personality rating.
>
> As it now stands this form is probably most useful in having the faculty rate the present student body at the end of the scholastic year, and using the ratings in writing recommendations for employment or for further school transfers.[13]

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13 Paul J. Lilly, On. cit., p. 32.

2. Chappen's Validation Study.

Following the leads offered by Lilly, Chappen[14] undertook a validation of the scale, using as subjects the incoming freshman class of the University of Scranton in the fall of 1955. At the conclusion of the presentation of his research, Lilly offered, among others, the following two implications for further research:

> 5. The final scale could be sent to the high school principals and advisers of each member of the incoming freshman class at Keystone or some other similar college. The ratings obtained could then be correlated with combined criterion scores obtained upon completion of their college stay. This follow-up study would determine whether the scale had any predictive possibilities.
>
> 6. Forced-choice rating scores obtained with this scale might be used along with high school rank, scholastic aptitude tests scores, etc., in a multiple correlation of college success.[15]

Chappen undertook to validate the "Keystone Student Description Sheet" to discover whether it would predict scholastic success for college freshmen in a regular four-year liberal arts college. She sought also to discover whether or not the scale would serve a useful purpose by its inclusion in a college entrance battery.

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14 Dorothea P. Chappen, Validation of a Forced-Choice Rating on University of Scranton Freshmen, unpublished Master of Arts thesis presented to the Department of Education of the University of Scranton, Scranton, Pennsylvania, 1956.

15 Paul J. Lilly, Op. cit., p. 77.

a) Procedure - The fall, 1955 freshman class at the University of Scranton, as was previously mentioned, were chosen as subjects for this validation study. Usable description sheets for 195 students, 46% of the class, were received.

The class was divided into four validation groups according to curriculum, namely, arts and social studies, science, engineering, and business.

The description sheets were completed by the principal or a teacher or a guidance counselor of the high school from which the freshman had graduated.

Chappen also employed Lilly's process of alternate rankings to obtain what she called "citizenship scores", a method of assessing college success in terms of over-all personality traits.

The description sheets were scored according to the weights assigned by Lilly. Reliability was investigated by means of Pearson correlations, boosted by the Spearman-Brown prophecy formula. The coefficient of reliability was obtained by taking the total of the odd-numbered tetrads and correlating it with the total of the even-numbered tetrads.

Citizenship rankings and grade-point average scores were converted into standard scores and were averaged into a combined criterion score. Correlations were computed for

grade-point average, citizenship rankings, and combined grade-point average and citizenship rankings.

b) Results - Reliability of the scale was reported as .86 (Pearson) and .92 (Spearman-Brown).

Coefficients of correlation were found for grade-point average and forced-choice scale; citizenship rankings and forced-choice scale; and, finally, combined grade-point average and citizenship rankings and forced-choice scale. The correlations found were significant, several, however, only at the 5% level of confidence. The correlations found for each of the four subdivisions of the validation group are given in Table III.

c) Conclusions - Chappon makes the following conclusions:

> It appears that Lilly's twenty-six tetrad forced-choice rating scale is a valid and probably reliable blank as a predictive measure when completed by high school principal, faculty member or members, or guidance counselor of the high schools from which the University of Scranton freshmen graduated. From all indications, the scale seems to suggest a significant relationship to scores which represent a composite of academic achievement and overall personality rating.
>
> It is suggested that this form as it now stands be used as a criterion in selecting applicants to the University of Scranton. By no means is it suggested that the blank be used solely to do the selecting. However, in addition to the other predictive measures presently being used by the University, it is felt that this scale would be a useful and valuable aid in the selection process.

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16 Dorothea M. Chappon, Op. cit., p. 32.

Table III.- Coefficients of Correlation between Forced-Choice Scores (FCS) and Grade-Point Index (GPI), Citizenship Scores (CS), and Combined Grade-Point Index and Citizenship Scores.

Group	FCS and GPI	FCS and CS	FCS and GPI + CS
Arts and Social Studies	.63	.52	.66
Science	.65	.41	.64
Engineering	.41	.33*	.42
Business	.32*	.32*	.37

Dorothea P. Chappen, *op. cit.*, p. 30.

a Coefficients followed by an asterisk are significant at the 5% level of confidence. All others are significant at the 1% level of confidence.

3. Item-Item Analysis.

Before proceeding to a factor analysis of Lilly's scale, it was thought that a further item analysis should be made, using the data provided by Chappon's study. It will be recalled that twelve of the tetrads used in Lilly's final scale were rearrangements of his first scale and first used on his cross-validation group.[17] Also, Lilly's data was obtained from the almost complete population of a junior college, while Chappon used just the freshman class of a four-year liberal arts college. Finally, Lilly's scale proved to be cumbersome and time-consuming for the raters. If it were possible to decrease the length of the scale without harming its validity, it would prove to be a distinct advantage not only for ease of administration but also for a multiple factor analysis of the scale.

In the item analysis, Kelley's method[18] was applied, i.e., only the upper and lower 27% of the validation group was considered.

Estimates of the coefficients of correlation between item and test was obtained from tables prepared by

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17 See p. 26.

18 T. L. Kelley, Op. cit., p. 17-24.

Flanagan.[19] A correlation of .20 was considered critical. (Actually, only five coefficients fell below the lower limit set by Thorndike at .25.) The results of this item analysis are presented in Appendix 3.[20]

As a result of the item analysis, ten tetrads were dropped from the scale. With the permission of the author, a revised scale of sixteen tetrads was prepared, now titled: "University of Scranton Student Description Sheet". The directions given the raters were also revised. This scale, which was the form used for obtaining the data used in the factor analysis presented in this study, may be seen in Appendix 4.[21]

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19 J. C. Flanagan, "General Considerations in the Selection of Test Items and a Short Method of Estimating the Product-Moment Coefficient from the data at the Tails of the Distribution", in the Journal of Educational Psychology, Vol. 30, No. 9, 1939, p. 674-680.

20 See Appendix 3, p. 78.

21 See Appendix 4, p. 83.

CHAPTER III

EXPERIMENTAL DESIGN

This chapter presents the procedures used in a multiple factor analysis of Lilly's forced-choice scale and the other measures used in one college entrance battery.

An implicit assumption underlying both Lilly's and Chappen's work is that Lilly's forced-choice scale is measuring factors not necessarily found in the other college entrance tests, or at least not found in the same degree. Hence their conclusion that the forced-choice scale in question adds predictability when included in the entrance test battery.

The hypothesis here is that Lilly's scale does not measure factors different from those measured by the other tests used for admission at present at the University of Scranton.

To test this hypothesis, a factor analysis was undertaken to seek the answers to the three questions proposed in the introduction:

1) What in fact does Lilly's forced-choice scale measure?

2) Are the traits measured by Lilly's scale different from those measured by the other college entrance tests?

3) If the factors measured by both the forced-choice scale and other tests are similar, is there evidence to indicate that the forced-choice scale gives added, significant predictability to a college entrance battery by its inclusion?

1. The Measures.

The scores to be included in the factor analysis, in addition to those obtained on Lilly's scale, are those achieved by the freshman class at the University of Scranton for the scholastic year 1958-1959 on the University of Scranton entrance battery.

To be eligible for admission at that University, applicants must attain a total raw score of 180 (33rd centile) in twelfth-grade norms in the Iowa High School Content Examination; a total raw score of 40 (32nd centile) in twelfth-grade norms in the Ohio State University Psychological Test; and, finally, they must attain a score of three or more on a five-point scale for general academic achievement in the high school from which they were graduated. Each of these measures will be considered briefly below.

a) Iowa High School Content Examination[1] - This is an achievement battery:

> [...] designed to provide a quick and accurate appraisal of the high school junior's and senior's and college student's knowledge in each of the four basic areas of the typical high school curriculum. These four areas, (1) English and Literature, (2) Mathematics, (3) Science, and (4) History and the Social Sciences, are sampled by a total of 335 items. The total score furnishes an over-all evaluation of the student's general mastery of these fields.[2]

Form L, revised in 1943, was used in this study. A total testing period of seventy-five minutes was required for administration.

The authors of this test sought to establish its validity by computing correlations between scores on each of the subtests and school grades. The correlations reported ranged from .50 to .60.[3] "Total scores on the test correlate to about the same degree with general grade-point averages. These data constitute further evidence of the validity of the examination."[4]

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1 H. B. Stuit, H. A. Greene and G. A. Ruch, Iowa High School Content Examination, Iowa City, Iowa, Bureau of Educational Research and Service, State University of Iowa, 1943.

2 H. B. Stuit, H. A. Greene and G. A. Ruch, Examiner's Manual for Quick-Scoring Forms L and M, 1943 Edition, The Iowa High School Content Examination, Iowa City, Iowa, Bureau of Research and Service, State University of Iowa, 1943, p. 5.

3 Ibid., p. 10.

4 Ibid., p. 11. Unfortunately, the authors do not report these data.

Coefficients of reliability were computed by the Kuder-Richardson[5] "foot-rule" formula and are reported in Table IV.

b) Ohio State University Psychological Test[6] - This power test is designed to evaluate general scholastic aptitude.

> It has consistently demonstrated an unusually high predictive significance for academic work. As a result it is now widely used for prediction of academic success in college or in advanced training.
> The test is composed of three parts: same-opposites, word relationships, and reading comprehension.[7]

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5 G. F. Kuder and M. W. Richardson, "The Theory of the Estimation of Test Reliability", in Psychometrika, Vol. II, No. 3, 1937, p. 151-160. The authors of this article assume that in theory the best estimate of the coefficient of reliability is an exact definition of the equivalence of the two forms of the test. They discuss methods of estimating test reliability in several different circumstances and derive several different formulae. Their basic formula may be stated as follows:

$$r_t = \frac{\sigma t^2 - \sum_1^n pq + \sum_1^n r_{11}pq}{\sigma t^2}$$

where σt^2 is the estimated variance, $\sum_1^n pq$ is the sum of the item variances and $\sum_1^n r_{11}pq$ is the sum of item reliabilities and their variances.

6 Herbert A. Toops, Ohio State University Psychological Test, Chicago, Illinois, Science Research Associates, 1941.

7 Herbert A. Toops, Manual of Directions, The Ohio State University Psychological Test, Chicago, Illinois, Science Research Associates, 1941, p. 1.

Table IV.- Coefficients of Reliability Computed for the Iowa High School Content Examination, Form L, by the Kuder-Richardson "Foot-Rule" Method.
(N = 6000)

Section	Grade 12	Grade 13	Age 17 - 18 years[a]
1	.889	.913	.907
2	.896	.922	.900
3	.871	.907	.896
4	.892	.919	.889
Total	.923	.947	

Stuit, Greene and Ruch, Examiner's Manual, The Iowa High School Content Examination, p. 11.

a Group of 2519 twelfth-grade students between the ages of seventeen and eighteen.

The reliability coefficient for Form 21, that used in the present study, was reported as .93, based on 300 cases. The criterion used for the validation of Form 21 was the quality point index covering a full college year of 36 weeks. An r of .68 was reported, based on 1030 cases.[8]

c) High school rank - Scores indicating achievement in the high schools from which the applicants had been graduated were indicated on a five-point scale as follows: one point if the graduate's general average placed him in the lowest fifth of his class; two points if he was placed in the fourth fifth; three points for the middle fifth; four points for the second fifth; and five points for the highest fifth.

d) The criterion - The criterion score is the quality point index for the first semester of the scholastic year, 1958-1959.

The quality point index is the point-hour ratio of the students' grades for the semester. Three quality points per semester hour are given for the grade of A; two quality points are given for the grade of B; one quality point for the grade of C; and, no quality points are given for the grades of D and F. The quality point index can range,

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8 Ibid., p. 2.

therefore, from 0.00 to 3.00. It can easily be computed by the following formula: GPI = $\frac{a}{b}$, where a = total number of semester hours of credit taken and b = the total number of quality points earned.

First semester grades were used since Harris[9] found that they were the best single criterion for the prediction of later college grades.

2. The Sample.

The population from which the sample was drawn was the fall, 1953 freshman class at the University of Scranton, a Catholic, four-year liberal arts college for men. The total number of freshmen enrolled was 450. Forced-choice rating scales were received for 399 students from 97 different high schools. Of the scales received only 342, 76% of the freshman class, were accurately and completely checked and hence usable.

The students included in the sample can be described as follows: 72% were 17 or 18 years of age; 81% were residents of northeastern Pennsylvania; 40% are graduates of Catholic high schools, 50% graduates of public high schools; and 82% are Catholics. A more complete breakdown of the

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9 Daniel Harris, "Factors Affecting College Grades: A Review of the Literature 1930-1937", in Psychological Bulletin, Vol. 37, No. 3, 1940, p. 125.

sample can be seen in Table V.

As indicated above, the sample was drawn largely from residents of northeastern Pennsylvania, - the cities of Scranton and Wilkes-Barre and other communities in the Lackawanna and Luzerne valleys. This region, for many years the center of the now-faltering anthracite mining industry, is an economically depressed area.

Although all of the students speak English as their native tongue, a questionnaire[10] prepared by the Guidance department of the University revealed that 19% of the total student population speak a foreign language at home, at least part of the time. The languages spoken are: Hungarian, Italian, Polish, Russian, Slovak, and Ukranian.

The same questionnaire indicated that 70% of the students enrolled at the University of Scranton must earn all or some part of their college expenses in after school and summer employment.

Married students make up 8% of the total college population.

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10 G. Gordon Henderson, S.J., Student Information Blank, multilith questionnaire issued by the Guidance Department of the University of Scranton, Scranton, Pa., 1955.

Table 7.- Frequency Distribution with Respect to Age, Geographical, Religious, and Previous Educational Background of 342 University of Scranton Freshmen Included in the Sample.

	Number	% of Sample
Age		
17-18 years	247	72.2
19-20 years	40	11.4
over 20 years	55	16.4
Geographical Area		
Northeastern Pennsylvania	279	81.5
Other Parts of Pennsylvania	38	11.1
Other States	25	7.4
Graduates of		
Catholic Schools	165	48.2
Public Schools	171	50.0
Other Schools	6	1.8
Religion		
Catholic	282	82.5
Protestant	51	14.9
Jewish	9	2.6

3. The Factor Analysis.

The first step in preparing for the factor analysis was to arrange in orderly fashion the raw scores achieved on Lilly's scale, i.e., the raw scores for each of the two discriminating elements in each of the sixteen tetrads, plus the total scores; next, the raw scores for the Iowa High School Content Examination; the raw scores for the Ohio State University Psychological Test; and, finally, the quality point indices for each of the freshmen in the sample. There were scores for forty-four variables.[11]

The following steps comprised the factor analytic study:

1) The computation of Pearson intercorrelations.

2) A preliminary centroid factor analysis using one as the communalities. This analysis was undertaken to discover how many factors there are in the correlation matrix by selecting the factors whose roots are greater than one.[12]

3) Iterative factor analytic procedure to fix the communalities when the percent of variance approaches 100%.

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11 cf. Appendix 5, p. 88.

12 Actually, the term "root" is a misnomer borrowed from the principal axes factor analytic procedures. It is really the sums of the squares of the factor loadings for a factor.

Ten factor analyses were performed for this purpose.

4) Determine the centroid factors using the fixed communalities obtained above.

5) Factor rotation by Kaiser's[13] varimax method to an orthogonal simple structure.

The answers to the first two questions posed at the beginning of this chapter will be sought in the results of the factor analysis. To answer the third question as to whether or not the inclusion of the forced-choice scale in a college entrance battery will increase the predictability of the battery, it will be necessary to test the significance of the differences in the coefficients of correlation obtained for the battery without the forced-choice scale and the criterion as well as for the battery including the forced-choice scale and the criterion.

The results of the factor analysis are presented in the next chapter.

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13 Henry F. Kaiser, "The Varimax Criterion for Analytic Rotation in Factor Analysis", in Psychometrika, Vol. 23, No. 3, 1958, p. 187-200.

CHAPTER IV

RESULTS

1. Correlations.

A study of the correlation matrix[1] used in the factor analysis confirms previous studies[2] that high school rank and scores on achievement and intelligence tests correlate with actual college achievement. Correlations between the above and quality point index (the criterion to be predicted) were found as follows: .47 (high school rank); .35 (Iowa High School Content Examination); and, .45 (Ohio State University Psychological Test). A correlation of .31 was found between the quality point index and Lilly's scale.

Correlations found between Lilly's scale and the college entrance tests (predictors) were: .54 (high school rank); .33 (Iowa); and .37 (Ohio).

2. Interpretation of Factors.

Factor loadings derived from Lilly's scale, high school rank, the Ohio State University Psychological Test,

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1 See Appendix 6, p. 120.

2 See, for instance, Wilma T. Donahue, C. Coombs and Robert Travers, The Measurement of Student Adjustment and Achievement, Ann Arbor, University of Michigan Press, 1949, p. 154, 155, 157.

the Iowa High School Content Examination and the quality point index, after application of Kaiser's varimax criterion for analytic rotation to the centroid factors,[3] are presented in Table VI.

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3 For unrotated, centroid factor loadings, see Appendix 7, p. 126.

Table VI.- Rotated Orthogonal Factor Loadings (Varimax Criterion) for University of Scranton 1958-1959 Freshmen's College Entrance Scores. (Decimal points omitted.)

	Variables	Factors I	II	III	IV	V	VI
	Forced-Choice Scale						
1	Neat in work (1b)	4708	-1434	0954	-0808	-0742	-2188
2	Has had trouble with teachers (1c)	7335	-0573	-0243	0204	0016	-1935
3	Has no goal in life (2a)	3506	-0144	2320	-0343	-0242	2774
4	Has been chosen as a student activity leader (2d)	3479	-0074	2643	0514	1028	1788
5	Easily distracted (3a)	6341	-0205	1415	-0701	-0947	0313
6	Makes a habit of being prompt in everything (3d)	5423	-1067	0129	-1417	-0803	1386
7	Has an excellent memory (4b)	0135	-1896	4574	-1614	-0386	-0223
8	Uses biting sarcasm (4c)	4081	-1337	-0636	-1284	-0926	-3982
9	Sometimes does more than assigned (5a)	5952	-2239	3709	-1791	-0719	-0951
10	Learns slowly (5b)	1511	-2190	5208	-0881	-0083	0581
11	Relies on others for decisions (6b)	1902	0898	4015	-0107	0312	3814
12	Can be trusted to handle delicate situations (6c)	4645	-0449	3550	-0775	0039	-0173
13	Doesn't know opinion from fact (7c)	4782	-0291	3808	-1045	-0290	-0022
14	Inclined to be deep, intellectual (7d)	4594	-1953	2626	-2199	-1728	0621
15	Conscientious about work (8a)	7578	-0910	1213	-0212	-1650	-0031
16	Takes special delight in getting by (8b)	5662	-1786	0550	-1130	-1359	-0493
17	Makes good use of free time (9a)	6485	-1346	1053	0079	-2535	0649
18	Cannot maintain a long, sustained effort (9b)	4133	-0403	2919	-1309	-0178	3152
19	Influences others in the wrong direction (10a)	5531	0481	1153	0794	-4878	-1262
20	Has accumulated much general knowledge (10d)	2835	-1651	2458	-1784	-3409	-0174
21	Has selected a suitable vocational field (11a)	5824	-1759	2343	-0861	-0324	1658
22	Follows line of least resistance (11c)	6514	-0493	1408	-0102	1293	1026

Table VI.- Rotated Orthogonal Factor Loadings. (Cont'd.)

	Variables	Factors					
		I	II	III	IV	V	VI
	Forced-Choice Scale						
23	Lives for the day - puts off facing the music (12c)	5535	1064	2415-0193		1482-0532	
24	Appreciates the problems of others (12d)	8110-0542		0138-0197		0144-0790	
25	Puts off doing things (13b)	6324-0596		2567-0699-0161		1720	
26	Has a keen mind (13d)	2312-3196		5246-2009-0620		2085	
27	Plans work well in advance (14b)	6145-1201		1443-2042	0076	1091	
28	Hasn't gotten around to thinking realistically about life's work (14c)	6054	0138	2684-1657	1732	0453	
29	School work is very important to this person (15a)	7313-1656		1347-0843-1120		1435	
30	"Don't care" attitude (15c)	7932-0242-0284-0339-0160				1063	
31	Doesn't care much for school work (16c)	7091-1550		2121-0337-0893		0867	
32	Has good command of English and uses it effectively (16d)	2399-1566		4486-1999-1100		0580	
33	Total Forced-Choice Score	8955-1346		4029-1446-0751		0571	
	Ohio State Psychological Test						
34	Same-Opposites	0282-4667		1273-6770-0547		0323	
35	Word Relationships	0973-3819		2235-7613	5479-0097		
36	Reading Comprehension	0815-3611		1867-7310-0764-0896			
37	Total Score	1216-4037		1965-8725-0198-0532			
	Iowa High School Content Examination						
38	English and Literature	0929-7170		1387-3261-0015		0144	
39	Mathematics	0978-6358		1979-2626	0135-0451		
40	Science	1519-7151		1242-1664-0545-0045			
41	History and Social Studies	1637-7962		0474-1942-0125-0328			
42	Total Score	1455-9913		1285-2058	0203-0133		
43	High School Rank	3995-3084		2771-2453-0365		2059	
44	Quality Point Index	1890-2446		0965-4163-0289		1418	

Six separate factors emerge from the factor analytic process. Three, factors I, II, and IV, stand out more clearly than the rest and may be described in very general terms as a) an attitude of conscientiousness factor; b) a scholastic achievement factor; and, c) a scholastic aptitude or intelligence factor.

The remaining three, factors III, V, and VI, are more difficult to identify. A tentative description of these factors is offered as follows: d) practical ability and judgement; e) aggressiveness in social relations; and f) self-reliance.

a) Factor I - Attitude of conscientiousness.

33	Total forced-choice score	.89
24	Appreciates the problems of others	.81
30	"Don't care" attitude	.79
15	Conscientious about work	.75
2	Has had trouble with teachers	.73
29	School work is very important to this person	.73
31	Doesn't care much for school work	.70
22	Follows line of least resistance	.65
17	Makes good use of free time	.64
5	Easily distracted	.63
25	Puts off doing things	.63
27	Plans work well in advance	.61
28	Hasn't gotten around to thinking realistically about life's work	.60
9	Sometimes does more than assigned	.59
21	Has selected a suitable vocational field	.58
16	Takes special delight in getting by	.56

The highest loadings on factor I are found in the fifteen elements of Lilly's scale indicated above. One might be tempted to call this factor a student's attitude factor (or even a scholastic attitude factor) since it may be felt to reflect a definite set on the part of the student

rated towards his scholastic activity in general. Closer scrutiny, however, of the variables which load on this factor reveals that the attitude in question is not necessarily an attitude towards scholastic matters. Only three (2, 29 and 31) refer clearly to the academic. It would seem to be an attitude toward achievement in general, not necessarily toward academic achievement.

This attitude can, perhaps, best be described more specifically as conscientiousness. The person who possesses this attitude reacts to the obligations he feels are imposed by his relationship to objective reality. He has a conscientious attitude towards school work because he is a conscientious person.

That intelligence and achievement in specific subject matter fields are not part of this factor is clear from the very low loadings reported for the intelligence test (Ohio), .12, and the achievement battery (Iowa), .14. This would seem to be further confirmed by the following list of forced-choice scale elements with extremely low loadings:

7	Has an excellent memory	.01
10	Learns slowly	.15
26	Has a keen mind	.23
32	Has a good command of English and uses it effectively	.23

General overall school achievement would seem to be related to the student's attitude by the higher loading (.39) found for high school rank.

b) Factor II - Past Achievement.

42	Total score, Iowa	.99
41	Part IV, Iowa	.80
38	Part I, Iowa	.72
40	Part III, Iowa	.72
39	Part II, Iowa	.64
34	Part I, Ohio	.47
37	Total score, Iowa	.40
35	Part II, Ohio	.38
36	Part III, Ohio	.36

Loadings on factor II are minimal for the forced-choice scale (.13 for total score). Loadings reported for the intelligence test are moderately high, ranging from .36 to .47. Very high loadings were found for the achievement battery with a range from .64 to .99.

Since intelligence is clearly related to superior achievement, it is not surprising that relatively high loadings were found for an intelligence test. The uniformly very high loadings for the achievement battery, however, would seem to lend weight to the designation of this factor as, predominantly, an achievement factor.

Factor II is not a clear unitary factor. A perusal of the variables which load on this factor will indicate that intelligence, industriousness, good schools, achievement, and many other things are involved. Since the present study is concerned with discovering what factors Lilly's scale measures no further attempt will be made to identify more specifically this factor. This is a factor not found in Lilly's scale.

c) Factor IV - Intelligence or scholastic aptitude.

37	Total score, Ohio	.87
35	Part II, Ohio	.76
36	Part III, Ohio	.73
34	Part I, Ohio	.68
44	Quality point index	.41

Loadings found for factor IV are somewhat the reverse of those found for factor II. Only one part of the achievement test, Part I, English and Literature, has a significant loading on this factor. A loading of .87 was found for the total intelligence score with loadings of .68, .76, and .73, respectively, for the three subtests.

Again, it is not surprising that a moderately high loading was found for the first part of the achievement battery. The Ohio State University Psychological Test is highly verbal and one would have expected a moderately high loading for an English test.

Since superior intelligence is clearly related to superior college achievement we would expect a significant loading for quality point index. The loading found, .41, fulfills this expectation.

In view of the very high loadings found for the psychological test, this factor would seem best labelled an intelligence or general scholastic aptitude factor.

Again, it is important to note that this is not a factor found in Lilly's scale.

d) Factor III - Practical Ability and Judgement.

10	Learns slowly	.52
26	Has keen mind	.52
7	Has excellent memory	.46
32	Has good command of English and uses it effectively	.45
11	Relies on others for decisions	.40
33	Total forced-choice	.40
13	Doesn't know opinion from fact	.38
9	Sometimes does more than assigned	.37
12	Can be trusted to handle delicate situations	.36

Significant[4] loadings on factor III were found only for the above elements (and total score) of the forced-choice scale.

Identification of this factor is difficult. The four elements with the highest loadings seem to be related to ability; the fourth, i.e. 32, seems to be related to achievement as well. Yet no significant loadings are found for intelligence (Ohio: total score, .19); nor for achievement (Iowa: total score, .12; high school rank, .27; quality point index, .09).

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4 In this study a factor loading of absolute value equal to, or greater than, 0.30 is arbitrarily defined as significant. "Adoption of some such arbitrary criterion is necessitated by the fact that the sampling distributions of factor loadings are unknown." David D. Smith, The Relationship between Abilities and Interests: a Factorial Study, unpublished Ph.D. thesis presented to the Department of Psychology of McGill University, Montreal, 1957, p. 9. See also Guilford's studies; v.g., J. P. Guilford, H. W. Kattner, and P. R. Christensen, "Studies of Aptitudes of High-level Personnel", in Reports from the Psychological Laboratory, The University of Southern California, No. 13, 1955, p. 12.

Possibly the ability isolated here might be a kind of "practical" ability, as opposed to a "theoretical" ability measured by tests of scholastic aptitude and achievement. The remaining four significant elements, i.e. 11, 13, 9, and 12, might be understood in the same way, a kind of practical "savoir faire", an exercise of practical judgement.

Factor III, then, may, perhaps, best be called practical ability and judgement. This factor is found only in Lilly's scale.

e) Factor V - Aggressiveness in Social Relations.

19	Influences others in the wrong direction	.49
20	Has accumulated much general knowledge	.34
35	Part II, Ohio - Word relationships	.55

With only three variables loading significantly on this factor, it is difficult to feel any great confidence in attaching a label to it. Nevertheless when it is kept in mind that intelligence and achievement are not part of this factor it is perhaps easier to see something common to the three. If variable 35 is considered first, leaving intelligence aside, we have left the use of words, conversation: basic social communication. If formal learning as measured by scholastic achievement tests is put aside, variable 20 may possibly be best understood to have taken place because of association with other individuals in the ordinary day to

day experience of social intercourse. There is, then, a social flavor to this factor.

Only variable 19 remains to help further specify this social factor. What is added by this variable would seem to be an indication of direction or control of the social situation. The ego is controlling, not controlled, - is active, not passive. With these considerations in mind, then, the following tentative description of this factor is offered: aggressiveness in social relations. There would not seem to be, however, sufficient evidence to indicate whether or not the aggressiveness noted is to be considered a personality defect or a virtue.

f) Factor VI - Self-Reliance.

8	Uses biting sarcasm	.40
11	Relies on others for decisions	.38
18	Can not maintain a long, sustained effort	.32

Consideration of the above three variables conveys an impression of a measure of the individual's confidence in self.

Again, since only three variables load on this factor (none of which have particularly high loadings) it is not possible to give an unequivocal name to this factor. Possibly, this factor might best be considered a measure of self-reliance.

It is perhaps of greater significance that only elements of Lilly's scale show significant loadings on the last three factors considered, III, V, and VI.

SUMMARY AND CONCLUSIONS

1. Summary.

In an investigation of Lilly's assumption that his forced-choice scale measures factors not already being measured in a college battery, a factor analysis of his scale and a battery of college entrance tests was undertaken.

The factor analysis method was employed since this study sought the answer not only to the question, "What does Lilly's scale measure?", but also the answer to the following, "Are the factors measured by Lilly's scale different from those measured in a college entrance battery?". Methods involving multiple correlations, multiple regression equations, and the discriminant function were considered. A factor analytic study was decided upon because it seemed that such a study would afford a clearer answer to the questions proposed.

The sample used in the study was 342 freshmen (1958-1959) of the University of Scranton. Ratings on Lilly's forced-choice scale were obtained for each of these students from his high school principal, teacher, or guidance counselor.

The Ohio State University Psychological Test and the Iowa High School Content Examination were administered to each of the freshmen. In addition, a score on a five-point

scale was obtained for each student's rank in his high school class.

The following steps were followed in the factor analysis:

a) Pearson intercorrelations were obtained for the forty-four variables.

b) Factors were extracted by the centroid method. Communalities were estimated from ten iterative analyses.

c) Factors were rotated according to Kaiser's varimax criterion.

All of the above calculations were done on the Illiac computer in the Digital Computer Laboratory at the University of Illinois.

2. Conclusions.

The conclusions of this study can, perhaps, best be reported in terms of the questions proposed at the outset.

a) What in fact does Lilly's forced-choice scale measure?

The analysis of the factor loadings obtained show that Lilly's scale loads on factor I, attitude of conscientiousness; factor III, practical ability and judgement; factor V, aggressiveness in social relations; and, factor VII, self-reliance.

b) Are the traits measured by Lilly's scale different from those measured by the other college entrance tests?

The answer to this question is clearly in the affirmative. Lilly's scale loads on factors I, III, V, and VI. With the single exception of the one instance cited (variable 35 with a loading of .55 on factor V) no significant loadings were found on these factors for the aptitude or achievement tests.

The achievement battery (Iowa) loads highly on factor II. Only one element of Lilly's scale shows any significant loading on this factor (variable 26 with a loading of .32).

The scholastic aptitude test (Ohio) shows highest loadings on factor IV. No significant loadings were found for any element of Lilly's scale.

Hence it must be concluded that Lilly's scale measures traits not measured by the other college entrance tests.

c) If the factors measured by both the forced-choice scale and the other tests are similar, is there evidence to indicate that the forced-choice scale gives added, significant predictability to a college entrance battery by its inclusion?

The condition posed in this question is not fulfilled as is clear from the answer to the preceding

question. It is valid to infer that the inclusion of Lilly's scale in a college entrance battery will increase the predictability of the battery since it is correlated with college success (r = .31) and it is measuring factors not measured by the other college entrance tests.

3. Implications for Further Research.

Although, as was asserted above, the inclusion of Lilly's scale in an entrance battery will increase the predictability of the battery, nothing is said of the magnitude of this increase. It would be of further interest to study the differences found in multiple correlations with the quality point index criterion when Lilly's scale is present in the battery and when it is absent.

To answer this question is not undertaken here since of primary concern were the questions, "What does Lilly's scale measure?" and "Does what his scale measures differ from what is measured by the other tests?" With what seems a relatively clear answer to these questions, the present study is complete.

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APPENDIX I

LILLY'S ORIGINAL FORCED-CHOICE SCALE

APPENDIX I

LILLY'S ORIGINAL FORCED-CHOICE SCALE

Below is reproduced Lilly's original scale of thirty-eight tetrads.

CONFIDENTIAL

KEYSTONE STUDENT DESCRIPTION SHEET

1. Name of student described	2. Student's status: applicant, freshman, etc.
3. Name of person describing student	4. Position of person describing student
5. Length of time describer has known student	6. In what capacity did describer know student?

DIRECTIONS

The student whose name appears at the upper left of this form is an applicant for admission to, or a student of Keystone Junior College. You have been mentioned as one who knows this young person well enough to describe him or her for the benefit of those of us who do not know this student but who will have to work with him or her on campus.

Your description will be kept confidential and will not be used as a basis for rejection, dismissal or disciplinary action. The purpose of this form is to give us some idea of the type of students we are getting. Such knowledge has been found most helpful in arranging school activities, appointing committees, planning social affairs, etc.

The remainder of this form is made up of blocks of four statements which have been used to describe students at Keystone Junior College. Read all the statements in each block carefully; then decide which of the four statements is MOST DESCRIPTIVE of the student you have been asked to describe.

Under the word MOST, place a check mark on the blank line before that statement. Perhaps you may feel that no statement is an exact description of your student, but, nevertheless, you must make the best choice you can. Then, from the remaining three statements, select the one that is LEAST DESCRIPTIVE of your student, and, under the word LEAST, place a check mark on the line before that statement.

Mark all of the blocks in a similar manner, selecting one item that is MOST DESCRIPTIVE, and another as LEAST DESCRIPTIVE. No ties or omissions are permitted.

You may feel that some of the judgements are very close, and that there are some you are not certain of. In either case, make the judgement that seems best to you from your knowledge of the student--limited though it may be.

Most	Least	-1-	Most	Least	-2-
____	____	Presents neat appearance.	____	____	Takes life much too seriously.
____	____	Lacks self-confidence.	____	____	Neat in work.
____	____	A stickler for details.	____	____	Has had trouble with teachers.
____	____	Responds well to praise.	____	____	Takes great care in grooming.

Most	Least	-3-	Most	Least	-4-
____	____	Has a keen mind.	____	____	Has no goal in life.
____	____	Blames others for his troubles.	____	____	Knows own limitations.
____	____	Very stable under pressure.	____	____	Belittles own ability.
____	____	Always takes the other side in a discussion.	____	____	Has been chosen as a student activity leader.

Most	Least	-5-	Most	Least	-6-
____	____	Very babyish for age.	____	____	Influences others in the wrong direction.
____	____	Is firm in his convictions.	____	____	Has an excellent sense of humor.
____	____	Is often "goat" for practical jokers.	____	____	Recreation and social life just don't fit into this person's academic schedule.
____	____	Works out problems on own.	____	____	Has accumulated much general knowledge.

Most	Least	-7-	Most	Least	-8-
____	____	Seeks advice.	____	____	Little or no will power.
____	____	Relies on others for decisions.	____	____	Hard-headed.
____	____	Can be trusted to handle delicate situations.	____	____	Makes friends easily.
____	____	Sulks when crossed.	____	____	Accepts work willingly.

Most	Least	-9-	Most	Least	-10-
____	____	Does not try to alibi.	____	____	Easily distracted.
____	____	Everything is a "racket".	____	____	Is able to take criticism.
____	____	Has a keen sense of values.	____	____	A glib talker.
____	____	Suspicious--always on guard.	____	____	Takes a habit of being prompt in everything.

Most	Least	-11-	Most	Least	-12-
____	____	Dates excessively.	____	____	Loves to be in the limelight.
____	____	Needs little guidance.	____	____	Has good work habits.
____	____	Wastes time in horseplay.	____	____	Accepts the inevitable calmly.
____	____	Inclined to be deep, intellectual.	____	____	Perfection in work is not this person's goal.

Most	Least	-13-	Most	Least	-14-
____	____	Coming to college was not this person's idea.	____	____	Conscientious about work.
____	____	Able to profit from suggestions.	____	____	Takes special delight in getting by.
____	____	Is very considerate of feelings and rights of others.	____	____	Feels he (she) is overworked.
____	____	Keeps self aloof from "common herd".	____	____	Has optimistic outlook on life.

Most	Least	-15-	Most	Least	-16-
____	____	Is unhappy much of the time.	____	____	Does not get along well with other people.
____	____	Has an excellent memory.	____	____	Always tries to make the best of everything.
____	____	Uses biting sarcasm.	____	____	Always late.
____	____	Is used to obeying necessary rules.	____	____	Consistent performer.

Most	Least	-17-	Most	Least	-18-
____	____	Sometimes does more than assigned.	____	____	Makes good use of free time.
____	____	Learns slowly.	____	____	Cannot maintain a long sustained effort.
____	____	Has had to work hard for what he (she) has gotten.	____	____	Doesn't recognize own outstanding faults.
____	____	Talks a good job.	____	____	Has many diverse interests.

Most	Least	-19-	Most	Least	-20-
____	____	Doesn't like responsibility.	____	____	Has selected a suitable vocational field.
____	____	Is reluctant to discuss personal problems with anyone.	____	____	Appears to appreciate self very much.
____	____	Sees point of view of others.	____	____	Follows line of least resistance.
____	____	Clear and logical thinker.	____	____	Does not hold a grudge.

Most	Least	-21-	Most	Least	-22-
____	____	Never challenges statements.	____	____	Very level-headed.
____	____	Level of aspiration is not suited to ability.	____	____	Repeats same mistakes.
____	____	Literally thirsting for knowledge.	____	____	Has brains never used yet.
____	____	Rarely needs prodding.	____	____	Has excellent ability for analysing.

Most	Least	-23-	Most	Least	-24-
____	____	Avoids making decisions.	____	____	Likes to impress others with his importance.
____	____	Likes to make things practical.	____	____	Judgements based more on emotion than reason.
____	____	High grades are important to this person.	____	____	Likes to argue.
____	____	Rules were made for "other people" to keep.	____	____	Keeps a strict schedule.

Most	Least	-25-	Most	Least	-26-
____	____	A reprimand hurts him (her) very much.	____	____	Worries about making decisions.
____	____	Puts off doing things.	____	____	Doesn't know opinion from fact.
____	____	Can see both sides to an argument.	____	____	Never lets social life interfere with studies.
____	____	Profits by past mistakes.	____	____	Is methodical.

Most	Least	-27-	Most	Least	-28-
____	____	Very seldom puts off assignments.	____	____	Unskilled in carrying on a conversation.
____	____	Works without much of a system.	____	____	Sometimes assumes a "Big I" attitude.
____	____	Chafes at doing routine assignments.	____	____	Has considerable poise.
____	____	Has good foundation in tool subjects.	____	____	Controls his emotions.

Most	Least	-29-	Most	Least	-30-
____	____	Never volunteers but does work assigned.	____	____	Has to be shown that he is wrong.
____	____	Makes errors thru undue haste.	____	____	Gets most satisfaction from social activities.
____	____	Has "up-and-down" moods.	____	____	Volunteers for "dirty jobs" no one else wants.
____	____	Does not give up easily on a difficult task.	____	____	Very naive and gullible.

Most	Least	-31-	Most	Least	-32-
____	____	Is not realistic in his ambitions.	____	____	Never lets school work interfere with social life.
____	____	Can not be depended upon	____	____	A "life-of-the-party" type.
____	____	Willing to spend considerable effort in acquiring mastery of new situation.	____	____	Lives for the day - puts off facing the music.
____	____	Commands respect from other students.	____	____	Appreciates the problems of others.

Most	Least	-33-	Most	Least	-34-
____	____	Tactful in dealing with others.	____	____	Likes to have his (her) little joke.
____	____	Has little time for activities.	____	____	Inclined to be radical in some beliefs and actions.
____	____	Doesn't care much for school work.			
____	____	Has good command of English and uses it effectively.	____	____	Conversation is very trite and unoriginal.
			____	____	Seeks advice when in doubt.

Most	Least	-35-	Most	Least	-36-
____	____	Can handle people exceedingly well.	____	____	School work is very important to this person.
____	____	Tends to go to extremes in habits.	____	____	A "sober-sides" most of the time.
____	____	Gripes when given additional work.	____	____	"Don't care" attitude.
____	____	Is an avid reader.	____	____	Is quite popular with associates.

Most	Least	-37-	Most	Least	-38-
____	____	Hasn't a worry in the world.	____	____	Likes the course he is following.
____	____	Plans work well in advance.	____	____	Has very little initiative.
____	____	Hasn't gotten around to thinking realistically about life's work.	____	____	Likes to do things in own way.
			____	____	Talks too much.
____	____	Can choose duty with a smile when pleasure beckons.			

PLEASE CHECK EACH BOX TO BE SURE THAT YOU HAVE CHECKED ONE ITEM AS "MOST DESCRIPTIVE" AND ONE ITEM AS "LEAST DESCRIPTIVE".

APPENDIX 2

LILLY'S REVISED SCALE

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LILLY'S REVISED SCALE

Lilly's revision of his scale - 26 tetrads - is given below. This is the form used by Chappen in her study.

CONFIDENTIAL

KEYSTONE STUDENT DESCRIPTION SHEET

1. Name of student described	2. Student's status: applicant, freshman, etc.
3. Name of person describing student	4. Position of person describing student
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The student whose name appears at the upper left of this form is an applicant for admission to, or a student of Keystone Junior College. You have been mentioned as one who knows this young person well enough to describe him or her for the benefit of those of us who do not know this student but who will have to work with him or her on campus.

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Under the word MOST, place a check mark on the blank line before that statement. Perhaps you may feel that no statement is an exact description of your student, but, nevertheless, you must make the best choice you can. Then, from the remaining three statements, select the one that is LEAST DESCRIPTIVE of your student, and, under the word LEAST, place a check mark on the line before that statement.

Mark all of the blocks in a similar manner, selecting one item that is MOST DESCRIPTIVE, and another as LEAST DESCRIPTIVE. No ties or omissions are permitted.

You may feel that some of the judgements are very close, and that there are some you are not certain of. In either case, make the judgement that seems best to you from your knowledge of the student--limited though it may be.

CHECK THIS BLOCK IF YOU DESIRE A COPY OF THE RESULTS OF THIS STUDY. ☐

Most	Least	-1-	Most	Least	-2-
____	____	Presents neat appearance.	____	____	Takes life much too seriously.
____	____	Lacks self-confidence.	____	____	Neat in work.
____	____	Keeps self aloof from the "common herd".	____	____	Has had trouble with teachers.
____	____	Responds well to praise.	____	____	Takes great care in grooming.

Most	Least	-3-	Most	Least	-4-
____	____	Has no goal in life.	____	____	Very babyish for age.
____	____	Knows own limitations.	____	____	Is firm in his convictions.
____	____	Likes to impress others with his importance.	____	____	Is often the "goat" for practical jokers.
____	____	Has been chosen as a student activity leader.	____	____	Works out problems on own.

Most	Least	-5-	Most	Least	-6-
____	____	Easily distracted.	____	____	Is unhappy much of the time.
____	____	Is able to take criticism.	____	____	Has an excellent memory.
____	____	Always takes the other side in a discussion.	____	____	Uses biting sarcasm.
____	____	Makes a habit of being prompt in everything.	____	____	Is used to obeying necessary rules.

Most	Least	-7-	Most	Least	-8-
____	____	Sometimes does more than assigned.	____	____	Little or no will power.
____	____	Learns slowly.	____	____	Makes friends easily.
____	____	Has had to work hard for what he has gotten.	____	____	Loves to be in the limelight.
____	____	Talks a good job.	____	____	Has good work habits.

Most	Least	-9-	Most	Least	-10-
____	____	Likes the course he is taking.	____	____	Seeks advice.
____	____	Has very little initiative.	____	____	Relies on others for decisions.
____	____	Likes to do things in own way.	____	____	Can be trusted to handle delicate situations.
____	____	Worries about making decisions.	____	____	Sulks when crossed.

Most	Least	-11-	Most	Least	-12-
____	____	Dates excessively.	____	____	Conscientious about work.
____	____	Needs little guidance.	____	____	Takes special delight in getting by.
____	____	Doesn't know opinion from fact.	____	____	Feels he is overworked.
____	____	Inclined to be deep, intellectual.	____	____	Never lets social life interfere with studies.

Most	Least	-13-	Most	Least	-14-
____	____	Doesn't like responsibility.	____	____	Makes good use of free time.
____	____	Is reluctant to discuss personal problems with anyone.	____	____	Cannot maintain a long, sustained effort.
____	____	Sees point of view of others.	____	____	Doesn't recognize own outstanding faults.
____	____	Clear and logical thinker.	____	____	Has many diverse interests.

Most	Least	-15-	Most	Least	-16-
____	____	Influences others in the wrong direction.	____	____	Does not get along well with other people.
____	____	Has an excellent sense of humor.	____	____	Accepts work willingly.
____	____	Recreation and social life just don't fit into this person's academic schedule.	____	____	Perfection in work is not this person's goal.
____	____	Has accumulated much knowledge.	____	____	Consistent performer.

Most	Least	-17-	Most	Least	-18-
____	____	Has selected a suitable vocational field.	____	____	Very seldom puts off assignments.
____	____	Appears to appreciate self very much.	____	____	Works without much of a system.
____	____	Follows line of least resistance.	____	____	Sometimes assumes a "Big I" attitude.
____	____	Does not hold a grudge.	____	____	Has a good foundation in tool subjects.

Most	Least	-19-	Most	Least	-20-
____	____	Can handle people exceedingly well.	____	____	Never lets school work interfere with social life.
____	____	Tends to go to extremes in habits.	____	____	A "life-of-the-party" type.
____	____	Gripes when given additional work.	____	____	Lives for the day - puts off facing the music.
____	____	Is an avid reader.	____	____	Appreciates the problems of others.

Most	Least	-21-	Most	Least	-22-
____	____	Coming to college was not this person's idea.	____	____	Never challenges statements.
____	____	Able to profit from suggestions.	____	____	Level of aspiration not suited to ability.
____	____	Is very considerate of feelings and rights of others.	____	____	Literally thirsting for knowledge.
____	____	A stickler for details.	____	____	Controls his emotions.

Most	Least	-23-	Most	Least	-24-
____	____	A reprimand hurts this person very much.	____	____	Hasn't a worry in the world.
____	____	Puts off doing things.	____	____	Plans work well in advance.
____	____	Can see both sides to an argument.	____	____	Hasn't gotten around to thinking realistically about life's work.
____	____	Has a keen mind.	____	____	Can choose duty with a smile when pleasure beckons.

Most	Least	-25-	Most	Least	-26-
____	____	School work is very important to this person.	____	____	Tactful in dealing with others.
____	____	A "sober-sides" most of the time.	____	____	Has little time for activities.
____	____	"Don't care" attitude.	____	____	Doesn't care much for school work.
____	____	Is quite popular with associates.	____	____	Has good command of English and uses it effectively.

APPENDIX 3

ITEM ANALYSIS

APPENDIX 3

ITEM ANALYSIS

The results of the item analysis of Lilly's revised scale (Appendix 2) are presented in the following table. A word of explanation is in order. On tetrad 1, of the top 27% of the validation group, 27 were rated as having element a as being most descriptive of them, while of the lowest 27%, 22 were so rated. The estimated coefficient of correlation of this element with the total test is .09. Since this element fell below a coefficient of .20 it was not considered valid. All elements which have a coefficient of .20 or higher are marked with an asterisk.

Item Analysis of Lilly's Revised Scale.

Item	Most Descriptive			Least Descriptive		
	Upper 27%	Lower 27%	r	Upper 27%	Lower 27%	r
1a	27	22	.09	0	0	.00
1b	3	8	-.27	15	16	-.02
1c	0	4	.00	32	28	.08
1d	19	15	.10	2	3	-.08
2a	3	7	-.19	9	13	-.23
2b	38	16	.46*	0	3	.00
2c	1	5	-.30	39	27	.27*
2d	7	21	-.35	1	1	.00
3a	1	5	-.30	33	20	.27*
3b	32	28	.09	0	3	.00
3c	1	9	-.43	13	17	-.10
3d	15	7	.22*	3	9	-.26

Item	Most Descriptive Upper 27%	Most Descriptive Lower 27%	Most Descriptive r	Least Descriptive Upper 27%	Least Descriptive Lower 27%	Least Descriptive r
4a	1	9	-.43	34	28	.13
4b	25	19	.12	1	1	.00
4c	1	2	-.12	12	12	.00
4d	22	19	.07	2	8	-.30
5a	2	13	-.42	29	12	.36*
5b	27	24	.05	4	5	-.05
5c	1	4	-.25	14	33	-.39
5d	19	8	.29*	2	9	-.33
6a	0	4	.00	16	17	-.03
6b	12	3	.33*	0	5	.00
6c	1	2	-.12	33	22	.23*
6d	36	39	-.12	2	4	-.14
7a	35	12	.47*	4	19	-.43
7b	2	16	-.48	26	8	.41
7c	10	14	-.12	3	7	-.19
7d	2	7	-.26	16	15	.02
8a	0	5	.00	31	23	.17
8b	18	22	-.10	0	3	.00
8c	1	9	-.43	17	11	.16
8d	30	13	.36*	1	12	-.50
9a	30	15	.32*	0	2	.00
9b	3	9	-.26	30	28	.04
9c	13	18	-.12	9	3	.26*
9d	3	7	-.19	10	16	-.15
10a	23	23	.00	1	8	-.40
10b	6	6	.00	10	4	.23*
10c	19	8	.29*	1	5	-.30
10d	1	12	-.50	37	32	.15
11a	0	2	.00	22	12	.23*
11b	19	20	-.04	4	9	-.20
11c	4	22	-.25	17	5	.35*
11d	26	3	.58*	6	21	-.37

Item	Most Descriptive Upper 27%	Most Descriptive Lower 27%	Most Descriptive r	Least Descriptive Upper 27%	Least Descriptive Lower 27%	Least Descriptive r
12a	44	24	.49*	2	10	-.36
12b	3	13	-.36	32	20	.25*
12c	1	7	-.37	10	13	-.08
12d	1	5	-.30	5	6	-.04
13a	1	8	-.40	29	19	.20*
13b	1	9	-.43	16	12	.10
13c	25	26	-.02	3	5	-.03
13d	22	6	.40*	1	13	-.36
14a	35	13	.45*	2	17	-.50
14b	1	17	-.58	23	11	.28*
14c	3	6	-.15	19	17	.04
14d	10	13	-.08	5	4	.05
15a	0	2	.00	42	32	.31
15b	14	32	-.37	0	2	.00
15c	4	3	.06	5	7	-.08
15d	30	12	.39*	1	8	-.40
16a	1	2	-.12	37	35	.05
16b	29	23	.11	2	10	-.36
16c	2	13	-.42	10	1	.46*
16d	17	11	.16	0	3	.00
17a	27	11	.36*	0	3	.00
17b	2	6	-.23	18	23	-.11
17c	2	13	-.42	26	16	.23*
17d	7	19	-.32	4	7	-.13
18a	29	14	.32*	3	13	-.37
18b	3	17	-.44	12	7	.17
18c	1	8	-.41	33	22	.21*
18d	15	9	.16	0	6	.00
19a	31	23	.17	1	5	-.30
19b	0	8	.00	26	23	.05
19c	4	14	-.33	21	10	.25*
19d	14	3	.39*	1	10	-.46

Item	Most Descriptive Upper 27%	Most Descriptive Lower 27%	Most Descriptive r	Least Descriptive Upper 27%	Least Descriptive Lower 27%	Least Descriptive r
20a	6	5	.04	13	16	-.07
20b	1	6	-.34	17	20	-.11
20c	1	13	-.51	17	6	.31*
20d	41	25	.37*	2	7	-.26
21a	0	7	.00	41	22	.41*
21b	32	30	.04	1	3	-.19
21c	15	9	.16	1	3	-.19
21d	2	3	-.08	6	21	-.37
22a	4	6	-.09	11	13	-.06
22b	0	11	.00	25	4	.52*
22c	8	4	.17	11	29	-.39
22d	37	28	.19	2	3	-.08
23a	3	7	-.19	25	24	.02
23b	2	14	-.45	21	9	.29*
23c	19	20	-.02	2	9	-.33
23d	25	8	.40*	1	7	-.37
24a	1	9	-.43	13	10	.08
24b	21	8	.32*	3	17	-.45
24c	2	15	-.46	33	16	.36*
24d	25	17	.17	0	6	.00
25a	35	15	.41*	1	9	-.43
25b	2	5	-.19	9	11	-.06
25c	0	7	.00	39	24	.33*
25d	12	22	-.23	0	5	.00
26a	30	24	.13	2	5	-.19
26b	8	7	.03	6	12	-.19
26c	1	14	-.54	41	21	.42*
26d	10	4	.23*	0	11	.00

APPENDIX 4

SECOND REVISION OF LILLY'S SCALE

APPENDIX 4

SECOND REVISION OF LILLY'S SCALE

Below follows the version of Lilly's Student Description Sheet after the second item analysis. This was the form used in the present study.

CONFIDENTIAL

UNIVERSITY OF SCRANTON STUDENT DESCRIPTION SHEET

1. _____
Name of student described.

2. _____
Name of person describing student.

3. _____
Position of person describing student.

4. _____
Length of time describer has known student.

5. _____
In what capacity did describer know student?

The student whose name appears at the upper left of this form has been accepted for admission to the University of Scranton. As his high school principal, teacher or counselor, you are in an excellent position to present a description of him which can be of great benefit to those who will work with him during his college days.

Your description will be kept confidential and will not be used as a basis for rejection, dismissal or disciplinary action.

DIRECTIONS

This student description sheet consists of sixteen blocks of four descriptive statements.

(1.) Read all the statements in each block carefully; then decide which of the four statements is MOST DESCRIPTIVE of the student. Under the word MOST, place a check mark on the blank line before the statement.

(2.) From the remaining three statements, select the one that is LEAST DESCRIPTIVE of the student, and, under the word LEAST, place a check mark on the line before that statement.

N.B.(1.) All sixteen blocks of descriptive statements should be treated as described above. You may feel that no statement presented is an exact description of the student, nevertheless, make a selection of the statement closest to the true description.

(2.) The description sheet will be of no value unless you check a statement which is MOST DESCRIPTIVE and LEAST DESCRIPTIVE for each of the sixteen blocks.

Sample

Most	Least	
_____	___x___	Likes sport cars
_____	_____	Likes to study
___x___	_____	Has many diverse interests
_____	_____	Needs constant guidance

In the sample above, a check mark was placed under LEAST for the statement "Likes sport cars", since from the observation of the describer, this item of the four presented, is LEAST descriptive of the student described.

A check mark was placed under MOST for the statement, "Has many diverse interests" because this item, of the four presented, is MOST descriptive of the student.

CHECK HERE IF YOU DESIRE A COPY OF THE RESULTS OF THIS STUDY. ( )

Most	Least	-1-	Most	Least	-2-
____	____	Takes life much too seriously.	____	____	Has no goal in life.
____	____	Neat in work.	____	____	Knows own limitations.
____	____	Has had trouble with teachers.	____	____	Likes to impress others with his importance.
____	____	Takes great care in grooming.	____	____	Has been chosen as a student activity leader.

Most	Least	-3-	Most	Least	-4-
____	____	Easily distracted.	____	____	Is unhappy much of the time.
____	____	Is able to take criticism.	____	____	Has an excellent memory.
____	____	Always takes the other side in a discussion.	____	____	Uses biting sarcasm.
____	____	Makes a habit of being prompt in everything.	____	____	Is used to obeying necessary rules.

Most	Least	-5-	Most	Least	-6-
____	____	Sometimes does more than assigned.	____	____	Seeks advice.
____	____	Learns slowly.	____	____	Relies on others for decisions.
____	____	Has had to work hard for what he has gotten.	____	____	Can be trusted to handle delicate situations.
____	____	Talks a good job.	____	____	Sulks when crossed.

Most	Least	-7-	Most	Least	-8-
____	____	Dates excessively.	____	____	Conscientious about work.
____	____	Needs little guidance.	____	____	Takes special delight in getting by.
____	____	Doesn't know opinion from fact.	____	____	Feels he is overworked.
____	____	Inclined to be deep, intellectual.	____	____	Never lets social life interfere with studies.

Most	Least	-9-	Most	Least	-10-
____	____	Makes good use of free time.	____	____	Influences others in the wrong direction.
____	____	Cannot maintain a long, sustained effort.	____	____	Has an excellent sense of humor.
____	____	Doesn't recognize own outstanding faults.	____	____	Recreation and social life just don't fit into this person's academic schedule.
____	____	Has many diverse interests.	____	____	Has accumulated much general knowledge.

Most	Least	-11-	Most	Least	-12-
____	____	Has selected a suitable vocational field.	____	____	Never lets school work interfere with social life.
____	____	Appears to appreciate self.	____	____	A "life-of-the-party" type.
____	____	Follows line of least resistance.	____	____	Lives for the day - puts off facing the music.
____	____	Does not hold a grudge.	____	____	Appreciates the problems of others.

Most	Least	-13-	Most	Least	-14-
____	____	A reprimand hurts this person very much.	____	____	Hasn't a worry in the world.
____	____	Puts off doing things.	____	____	Plans work well in advance.
____	____	Can see both sides of an argument.	____	____	Hasn't gotten around to thinking realistically about life's work.
____	____	Has a keen mind.	____	____	Can choose duty with a smile when pleasure beckons.

Most	Least	-15-	Most	Least	-16-
____	____	School work is very important to this person.	____	____	Tactful in dealing with others.
____	____	A "sober-sides" most of the time.	____	____	Has little time for activities.
____	____	"Don't care" attitude.	____	____	Doesn't care much for school work.
____	____	Is quite popular with associates.	____	____	Has good command of English and uses it effectively.

APPENDIX 5

RAW DATA

APPENDIX 5

RAW DATA

The Ohio State University Psychological Test, Form 21; the Iowa High School Content Examination, Form L; and, the University of Scranton Student Description Sheet were administered to 342 freshmen at the University of Scranton in the fall of 1958. Raw scores for these tests as well as scores on the other measures included in the factor analysis - high school rank and quality point index - are presented below.

a) Raw Scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1c	2a	1d	3a	3d	4b	4c	5a	5b	6b	6c	7c	7d	8a	8b
1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0
2	0	-1	0	-1	1	0	1	0	0	0	1	0	0	-1	-1	0
3	1	0	0	1	0	1	0	1	1	0	0	0	0	1	1	1
4	1	1	0	0	0	1	0	1	1	0	0	0	0	1	1	1
5	1	1	0	0	0	1	0	0	0	1	0	1	0	1	1	1
6	0	-1	0	-1	0	-1	1	0	0	0	1	0	-1	0	-1	0
8	1	1	0	0	1	0	0	0	1	0	0	1	0	0	1	0
9	0	0	0	0	-1	-1	0	0	-1	-1	0	0	-1	-1	-1	-1
10	0	1	1	0	0	0	-1	0	0	1	0	0	0	-1	1	0
11	0	1	0	0	0	0	0	1	-1	0	-1	-1	-1	0	-1	-1
12	1	1	0	1	0	0	0	1	1	0	0	1	1	0	1	1
13	1	1	0	0	1	0	0	1	1	1	0	0	0	1	1	1
14	-1	-1	-1	-1	-1	0	0	0	-1	0	-1	-1	0	0	-1	-1
15	1	1	0	1	0	0	1	0	1	1	0	1	0	1	1	0
17	1	1	0	0	1	0	0	0	1	0	0	0	1	0	0	-1
18	0	1	0	-1	0	0	0	1	1	0	0	0	0	1	1	1
20	0	0	0	0	0	0	0	-1	0	1	1	0	-1	-1	-1	0
23	1	1	0	0	0	-1	0	1	1	0	0	1	0	0	1	0
24	0	1	0	1	1	0	0	-1	-1	0	0	-1	-1	-1	0	-1
41	0	0	1	0	0	0	0	0	1	1	1	0	0	0	0	1
26	1	1	1	0	1	0	0	0	1	1	0	1	0	1	1	0
28	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1
29	1	1	0	0	1	0	0	1	1	1	1	0	0	1	1	1
30	1	0	0	0	0	0	0	1	0	1	-1	0	1	0	1	0
31	0	1	0	0	0	-1	1	1	0	0	-1	0	0	1	1	1
32	0	1	0	1	0	0	0	0	-1	0	0	-1	-1	0	0	0
33	0	1	0	-1	0	0	1	0	0	1	0	0	-1	0	-1	0
34	0	-1	0	0	0	-1	0	1	0	0	0	0	-1	-1	-1	0
35	-1	0	-1	-1	-1	-1	0	0	-1	0	0	0	0	-1	-1	-1
36	1	1	0	0	0	0	0	1	1	0	0	1	0	0	1	1
38	1	0	0	0	0	-1	0	1	1	0	0	-1	1	0	1	1
39	0	-1	0	-1	-1	0	0	0	-1	0	0	-1	-1	0	-1	-1
40	0	1	1	1	0	0	0	0	0	1	0	0	0	0	1	0
42	1	1	1	0	1	0	0	1	1	0	0	1	1	0	1	1
43	1	1	0	1	0	1	0	1	0	-1	0	0	0	1	1	0
45	1	1	0	1	1	0	1	0	1	1	1	1	0	1	1	0

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements																
	9a	9b	10a	10d	11a	11c	12c	12d	13b	13d	14b	14c	15a	15c	16c	16d	T
1	1	1	1	1	0	0	0	-1	0	-1	-1	-1	0	0	0	1	8
2	1	0	1	0	-1	0	1	1	1	0	0	0	0	1	0	0	4
3	1	0	1	1	-1	0	0	1	0	1	1	0	0	1	1	0	15
4	1	1	1	0	1	1	0	1	1	0	1	1	1	1	0	0	19
5	1	1	1	1	1	0	0	1	0	0	1	1	1	1	1	0	18
6	0	0	1	1	0	-1	-1	0	0	1	-1	-1	0	-1	-1	0	- 6
8	1	1	1	1	1	1	0	1	0	0	0	0	1	1	1	0	16
9	0	1	1	0	0	0	-1	-1	-1	0	-1	-1	0	0	-1	-1	-13
10	-1	0	1	0	1	0	0	1	0	-1	0	-1	0	0	1	0	3
11	-1	-1	0	-1	0	1	1	1	-1	0	0	-1	-1	0	-1	0	- 8
12	0	0	1	1	1	1	1	1	0	0	0	1	0	1	0	0	17
13	0	1	1	1	0	1	1	0	1	0	0	1	1	1	0	0	13
14	-1	0	0	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	0	-20
15	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	24
17	1	0	1	0	1	1	1	1	0	0	1	0	0	1	1	1	14
18	0	0	1	0	1	0	0	1	1	0	1	0	1	1	1	1	13
20	-1	0	-1	0	-1	0	0	-1	0	-1	0	0	-1	0	0	-1	-11
23	1	0	1	1	1	1	0	1	0	0	0	0	1	1	1	1	15
24	-1	0	1	0	0	-1	-1	-1	-1	-1	0	-1	0	0	-1	-1	-13
41	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	19
26	1	0	1	1	1	0	0	1	0	1	1	1	1	1	1	0	20
28	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	7
29	0	1	1	1	1	1	0	1	1	0	1	1	1	1	0	0	21
30	0	1	0	1	1	0	-1	0	-1	0	-1	-1	0	0	1	1	5
31	0	0	1	0	0	1	0	1	0	1	1	0	0	1	1	0	10
32	0	0	0	-1	0	1	-1	0	-1	-1	0	-1	0	0	0	-1	- 6
33	0	0	0	1	1	1	-1	0	1	1	0	0	-1	0	1	1	5
34	0	1	1	0	-1	0	0	0	-1	0	-1	-1	0	0	-1	0	- 7
35	-1	-1	0	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	0	-1	0	-21
36	1	0	1	0	0	1	1	1	0	0	0	1	0	0	1	0	14
38	1	0	1	1	0	0	1	0	0	0	1	1	0	0	0	0	10
39	-1	0	0	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	0	-21
40	1	1	1	0	1	1	1	1	1	0	0	0	1	1	1	1	17
42	1	0	1	0	1	1	1	1	0	0	1	1	0	0	0	0	1[illegible]
43	-1	0	1	0	0	0	1	1	1	0	0	1	0	1	1	0	12
45	1	0	1	1	1	0	0	1	1	1	1	0	1	1	1	0	22

c) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958.

Student	OSUPT Part 1	Part 2	Part 3	Total	IHSCE Part 1	Part 2	Part 3	Part 4	Total	HSR	QPI
1	17	30	39	86	38	31	28	28	125	1	.65
2	10	17	17	44	35	27	25	36	123	1	.81
3	15	35	25	75	50	50	46	62	208	5	1.66
4	22	50	45	117	65	50	32	64	211	5	1.88
5	12	20	19	51	32	14	25	44	115	3	1.68
6	25	41	49	115	74	48	61	70	253	3	1.38
8	4	12	24	40	34	15	27	21	97	3	1.41
9	13	23	27	63	40	30	33	41	144	3	.94
10	6	10	17	33	31	37	31	35	134	3	.82
11	4	9	19	33	26	30	22	32	110	1	.13
12	24	44	42	110	73	50	38	62	223	4	2.06
13	17	48	38	103	42	47	44	52	185	5	1.73
14	20	40	48	108	19	24	16	26	85	1	1.38
15	18	42	40	100	54	51	46	42	193	3	1.85
17	4	17	21	42	48	27	37	56	168	5	1.11
18	18	41	33	92	51	41	27	54	173	3	1.60
20	8	21	22	51	24	19	24	27	94	1	1.13
23	26	21	25	62	93	45	56	96	290	4	.57
24	19	21	26	56	40	46	41	32	149	3	1.10
41	5	23	26	54	38	40	36	50	164	3	1.26
26	15	22	26	63	52	49	53	42	196	4	.47
28	14	33	26	73	57	28	39	45	169	5	1.47
29	22	39	45	106	61	46	58	70	235	5	2.22
30	25	41	42	108	56	50	43	71	220	5	1.10
31	14	25	21	60	35	21	29	40	125	4	.76
32	9	25	19	53	52	28	45	48	173	4	.71
33	19	21	32	77	54	55	56	60	225	4	.88
34	15	25	18	58	29	21	21	36	107	1	.47
35	12	17	30	59	43	18	30	50	141	4	1.77
36	22	50	38	110	77	53	64	74	268	5	2.42
38	22	48	36	106	52	40	49	56	197	5	2.31
39	10	21	28	59	43	24	19	15	101	1	1.46
40	21	48	42	112	44	44	52	51	191	5	2.52
42	14	30	41	85	55	24	37	63	179	2	.15
43	17	27	42	86	74	41	40	78	233	4	.09
45	17	30	30	77	52	48	50	60	210	5	.63

a) Raw scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1e	2a	2d	3a	3d	4b	4e	5a	5b	6b	6e	7e	7[illegible]	8a	8b
46	0	0	0	0	0	-1	1	1	1	1	1	0	0	0	1	1
47	0	1	1	0	0	0	0	1	-1	0	0	0	-1	-1	1	1
48	1	1	1	1	0	1	0	0	0	0	0	1	0	1	1	1
49	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1
50	1	1	0	0	-1	0	0	0	0	0	0	-1	-1	0	0	-1
51	0	-1	0	-1	0	-1	1	0	-1	-1	0	0	-1	0	-1	0
52	0	0	0	-1	-1	-1	0	0	-1	0	1	0	0	0	-1	0
53	1	1	0	0	1	1	1	1	1	0	0	1	0	0	1	0
54	0	0	0	-1	-1	-1	1	0	-1	0	-1	0	-1	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
56	0	0	1	1	0	-1	0	0	1	1	0	1	0	0	0	-1
57	0	1	1	0	1	1	0	1	1	1	0	1	0	1	1	0
58	0	-1	0	0	-1	-1	0	1	-1	0	0	-1	0	-1	-1	-1
61	0	1	0	0	0	-1	0	0	0	0	0	0	0	-1	1	1
62	0	1	0	-1	0	0	1	1	1	0	-1	0	-1	0	0	0
63	0	-1	1	0	0	-1	0	1	-1	0	0	-1	0	-1	1	0
64	0	1	0	-1	0	1	0	1	-1	0	0	-1	0	1	1	1
65	0	1	1	0	1	0	0	1	1	0	1	0	1	1	1	1
68	0	0	-1	0	-1	-1	1	0	-1	0	-1	0	-1	-1	-1	-1
69	0	-1	0	0	0	-1	0	1	1	0	0	-1	0	1	1	0
70	1	0	0	-1	0	0	0	1	-1	-1	0	0	-1	-1	0	0
71	0	0	1	0	0	0	0	0	-1	0	0	1	-1	0	1	0
72	0	0	0	-1	0	0	0	1	-1	0	0	0	0	-1	1	1
73	0	1	0	-1	0	0	0	1	0	-1	-1	0	-1	0	-1	0
74	1	0	1	0	0	1	1	0	1	0	0	0	0	1	1	0
75	0	1	0	-1	0	0	0	1	1	0	0	1	0	0	1	0
76	0	-1	-1	-1	-1	-1	0	1	-1	0	0	-1	-1	0	0	-1
77	-1	0	1	0	0	1	1	1	1	0	0	-1	0	1	1	1
78	0	0	0	-1	0	1	0	1	-1	0	0	0	0	0	1	1
79	0	0	0	0	1	0	0	0	0	0	0	0	-1	0	1	0
80	0	0	0	0	0	0	0	0	-1	0	0	0	-1	0	1	0
76a	0	1	0	0	0	1	0	1	0	-1	0	0	-1	0	1	1
81	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1
82	1	1	0	0	0	-1	1	1	1	1	0	0	1	0	1	0
83	1	1	0	1	0	0	0	0	0	0	0	0	0	-1	0	-1
84	0	1	0	0	0	1	0	1	0	0	0	0	0	1	1	1

b) Raw Scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements																
	9a	9b	10a	10d	11a	11c	12c	12d	13b	13d	14b	14c	15a	15c	16c	16d	Σ
46	0	-1	1	1	0	-1	-1	0	0	0	0	0	0	1	0	1	7
47	0	0	1	1	0	1	-1	0	-1	-1	-1	0	0	1	-1	0	1
48	1	0	1	0	1	1	0	1	1	0	0	1	1	1	0	0	18
49	1	1	1	0	0	1	1	1	1	0	0	1	0	1	0	0	14
50	-1	-1	0	0	0	0	-1	0	0	-1	0	-1	1	0	1	0	- 5
51	0	0	0	1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-16
52	-1	-1	0	0	-1	-1	-1	-1	-1	-1	-1	0	-1	0	-1	-1	-16
53	1	0	1	1	1	1	0	1	1	1	1	0	1	1	1	0	21
54	-1	0	0	1	0	0	0	-1	0	0	0	-1	0	0	0	1	- 6
55	0	0	0	0	1	1	1	0	1	0	0	1	1	1	0	0	9
56	0	0	1	0	0	1	0	0	0	1	0	1	0	0	1	1	9
57	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	1	23
58	-1	-1	-1	0	-1	0	0	-1	-1	0	-1	0	0	-1	-1	0	-16
61	1	0	1	0	0	1	0	1	0	-1	0	0	0	1	0	0	5
62	1	0	1	1	0	-1	-1	0	0	1	1	1	0	0	1	0	6
63	0	-1	0	0	0	-1	0	-1	-1	0	0	-1	0	0	1	0	- 6
64	0	0	1	0	0	1	0	1	0	-1	0	-1	1	0	0	0	5
65	0	1	1	1	1	0	0	1	1	0	1	0	1	1	1	0	20
68	0	1	0	0	0	-1	-1	0	-1	0	-1	-1	0	0	-1	0	-13
69	0	-1	1	1	0	-1	0	0	-1	0	-1	-1	0	0	-1	0	- 3
70	0	0	1	1	1	0	1	0	0	0	1	1	0	1	0	-1	5
71	0	0	1	0	0	0	0	1	1	1	0	-1	0	0	0	0	4
72	0	0	0	0	0	1	0	1	1	0	0	-1	0	1	0	0	2
73	0	-1	1	1	0	-1	-1	0	-1	-1	-1	-1	0	0	-1	-1	-10
74	0	0	1	1	0	1	1	0	0	1	1	0	1	1	1	0	16
75	1	0	0	1	1	1	0	1	0	1	0	-1	0	1	0	1	11
76	-1	-1	0	0	0	-1	-1	-1	-1	0	-1	-1	0	-1	-1	0	-18
77	1	1	0	1	0	1	0	1	1	1	1	0	0	1	1	0	16
78	1	1	1	0	0	1	0	1	1	0	1	0	0	0	0	0	9
79	0	1	0	0	0	0	0	1	-1	0	1	1	0	1	1	0	6
80	0	1	0	-1	0	1	0	1	0	-1	0	0	0	1	0	-1	0
76a	1	0	0	0	0	1	0	1	0	-1	-1	0	0	1	1	0	6
81	1	0	0	0	0	1	1	1	1	0	0	1	0	1	1	0	13
82	0	0	1	0	1	1	1	1	-1	-1	1	1	1	0	0	0	13
83	1	0	1	0	1	1	0	1	0	0	0	-1	0	0	0	0	5
84	1	1	1	0	0	0	0	1	1	0	1	0	1	1	1	0	15

c) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT				IHSCE					HSR	QPI
	Part 1	2	3	Total	Part 1	2	3	4	Total		
46	12	34	22	68	39	19	32	30	120	2	.60
47	11	21	18	50	33	41	25	42	141	2	.89
48	17	27	29	73	61	39	42	87	229	4	1.00
49	5	22	16	43	36	40	33	35	144	4	1.82
50	7	11	14	32	45	31	50	52	178	5	.72
51	5	6	26	37	45	17	29	58	149	2	1.41
52	12	20	31	63	46	6	21	45	118	1	.12
53	9	26	31	66	50	20	35	66	171	5	2.37
54	11	30	20	61	51	18	26	52	147	3	.64
55	11	12	21	44	45	16	15	35	111	1	.33
56	16	41	31	88	47	23	37	51	158	1	.56
57	23	26	26	75	51	41	42	66	200	4	2.44
59	25	48	38	111	58	40	34	66	198	2	.93
61	3	18	17	38	35	23	18	36	112	4	1.00
62	12	27	32	71	51	40	31	54	176	2	.06
63	17	20	26	63	36	19	35	31	121	2	.81
64	7	14	19	40	23	24	15	35	97	3	.64
65	22	51	45	118	62	44	27	54	187	5	1.94
68	9	17	32	58	33	29	30	38	130	1	.44
69	25	42	38	105	72	47	42	80	241	4	1.57
70	9	24	32	65	30	12	18	25	85	1	2.31
71	19	23	34	76	52	34	37	47	150	3	1.06
72	19	15	29	63	54	36	43	61	194	4	.78
73	6	17	33	56	34	37	45	48	164	1	1.80
74	13	32	34	79	59	41	48	62	210	5	.68
75	14	38	34	86	42	49	56	61	208	2	1.78
76	10	27	20	57	44	44	35	47	170	1	.63
77	30	49	53	132	75	47	55	58	235	5	2.89
78	15	20	35	70	62	26	47	54	189	4	.53
79	23	36	42	101	37	31	31	40	139	2	2.11
80	13	36	17	66	20	16	30	37	103	3	1.33
76a	12	13	24	49	34	33	31	32	130	3	.66
81	16	33	36	85	45	45	42	37	169	4	.20
82	15	31	28	74	37	34	35	47	153	5	1.58
83	4	14	13	31	30	23	24	32	109	2	1.55
84	21	40	36	97	65	31	43	55	194	5	1.72

a) Raw scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1c	2a	2d	3a	3d	4b	4c	5a	5b	6b	6c	7c	7d	8a	8b
85	1	1	0	0	0	0	0	1	1	0	0	0	1	0	1	1
86	0	0	1	0	1	1	0	0	1	0	1	1	0	-1	1	0
87	0	-1	0	0	-1	0	0	-1	-1	0	0	-1	-1	-1	-1	-1
88	0	-1	0	0	-1	-1	0	-1	-1	0	0	0	-1	-1	-1	0
89	1	1	1	0	1	0	1	1	1	1	0	1	0	1	1	1
91	-1	-1	-1	-1	-1	0	-1	0	-1	-1	1	0	-1	0	-1	0
92	0	1	0	-1	0	1	0	1	0	0	0	0	0	0	1	0
93	0	0	1	1	0	-1	1	0	-1	0	0	-1	0	0	-1	0
94	1	1	0	0	1	1	1	1	1	1	0	1	0	-1	1	0
95	0	-1	0	0	-1	0	0	-1	0	1	0	0	-1	-1	0	0
96	0	0	1	0	0	1	0	0	1	1	0	1	0	1	1	1
97	0	1	0	-1	-1	0	0	1	-1	0	0	-1	0	0	-1	-1
99	1	1	1	0	0	0	0	1	1	0	0	1	0	0	1	0
100	0	0	1	0	0	-1	0	0	-1	0	0	0	0	-1	1	0
101	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0
102	1	1	0	0	0	0	0	1	0	-1	0	0	-1	0	1	1
103	0	1	1	0	1	0	0	0	-1	0	1	0	0	-1	1	0
104	1	1	0	1	0	1	0	0	1	1	0	1	0	0	1	0
105	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	-1
106	-1	-1	-1	0	-1	0	0	0	-1	0	0	0	-1	-1	-1	0
109	1	0	0	0	1	0	0	0	0	0	0	0	-1	-1	0	-1
111	0	1	0	-1	-1	0	0	1	0	0	-1	0	-1	0	1	1
112	1	0	1	0	1	0	0	1	1	0	-1	0	0	1	1	0
113	-1	0	-1	0	-1	0	0	0	0	0	-1	0	-1	-1	-1	-1
114	0	1	0	-1	1	0	0	1	1	0	0	0	1	1	1	0
116	1	1	0	0	0	1	0	0	0	0	0	1	-1	0	1	0
117	1	1	1	0	0	0	0	1	0	0	0	0	0	1	1	0
118	1	1	0	0	1	0	0	1	1	0	0	0	0	1	1	1
119	1	1	1	1	0	0	0	0	1	1	0	0	1	1	1	0
120	0	1	0	-1	0	0	0	1	0	0	-1	0	-1	0	1	0
121	0	-1	0	0	0	-1	1	0	-1	0	0	-1	-1	0	-1	-1
122	1	1	0	0	1	0	0	1	0	0	1	1	0	0	0	0
123	1	1	0	-1	0	0	0	1	0	0	-1	0	-1	0	0	1
124	0	1	1	0	0	1	0	0	0	-1	1	0	0	0	1	0
125	0	1	1	1	1	1	0	1	1	0	0	1	0	1	1	0

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 freshmen (1950-1955) of the University of Scranton. (Cont'd.)

Student	Elements 9a	9b	10a	10d	11a	11c	12c	12d	13b	13d	14b	14c	15c	16c	16d	T
85	1	0	1	0	1	1	1	1	0	0	0	1	0	1	0	0	19
86	1	0	1	0	1	1	-1	0	1	0	0	0	1	1	1	0	13
87	-1	0	-1	-1	0	-1	0	-1	-1	-1	-1	-1	-1	-1	0	-1	-21
88	-1	-1	0	-1	0	-1	0	-1	0	0	-1	-1	-1	-1	-1	0	-12
89	0	1	0	1	1	1	0	0	0	1	1	1	1	0	1	1	22
91	0	-1	0	1	-1	-1	-1	0	-1	0	-1	-1	-1	0	-1	0	-17
92	1	0	1	1	0	1	0	1	1	0	0	-1	1	1	1	0	11
93	-1	0	1	1	0	0	0	-1	-1	0	-1	-1	-1	0	0	0	-5
94	0	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	21
95	1	0	1	1	1	1	0	1	0	1	1	0	1	1	1	0	19
96	-1	-1	-1	0	-1	0	0	-1	0	0	0	-1	-1	-1	-1	0	-13
97	1	1	1	0	0	1	1	0	1	0	1	1	1	1	1	0	18
99	0	0	1	0	-1	0	0	-1	-1	0	-1	0	0	0	0	-1	-5
100	1	1	1	1	0	1	0	1	0	0	0	0	0	1	0	0	10
101	1	0	1	0	0	1	1	1	0	0	0	0	0	1	0	0	9
102	1	0	1	0	0	1	0	1	1	0	0	1	0	1	0	0	10
103	1	0	1	1	1	1	0	1	0	1	1	0	1	1	0	0	18
104	1	0	1	1	0	0	1	1	0	0	-1	0	0	1	0	0	7
105	0	-1	-1	0	0	1	-1	0	0	1	0	-1	-1	-1	0	-1	-13
106	1	0	1	0	0	0	-1	0	1	1	-1	-1	0	0	0	0	0
109	0	-1	1	0	-1	0	0	1	0	-1	-1	-1	0	0	0	-1	-4
111	1	0	0	1	1	1	0	1	1	0	1	1	1	1	1	0	17
112	0	-1	1	0	0	-1	0	-1	0	-1	-1	-1	-1	-1	-1	0	-16
113	1	0	1	1	1	1	1	1	1	0	1	0	0	1	1	0	17
114	0	0	1	0	1	1	1	1	1	0	1	1	1	1	1	0	15
116	0	1	1	1	0	1	0	-1	0	0	1	0	1	1	1	0	13
117	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	0	21
118	1	1	1	1	0	-1	0	0	1	0	0	1	0	0	1	0	15
119	0	-1	1	1	0	1	-1	0	0	-1	0	-1	0	0	-1	-1	-3
120	-1	0	-1	-1	0	-1	-1	0	-1	0	0	0	-1	0	0	-1	-14
121	1	0	1	0	-1	0	0	1	1	0	0	0	1	1	1	0	12
122	0	-1	1	1	-1	0	0	1	-1	-1	-1	-1	0	0	0	-1	-3
123	1	0	0	0	1	1	1	1	0	-1	0	0	1	1	1	0	11
124	1	0	1	1	1	1	0	1	1	0	0	0	1	1	1	0	20
125	1	0	1	0	1	1	0	1	1	1	0	1	1	1	1	0	21

c) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT Part 1	2	3	Total	IHSCE Part 1	2	3	4	Total	HSR	QPI
85	25	45	34	103	61	45	37	52	195	2	1.88
86	14	14	16	44	30	25	27	29	111	4	1.71
87	10	24	27	61	41	30	33	46	150		.94
88	14	21	37	72	42	26	26	44	138	4	.52
89	25	51	42	118	69	55	55	76	255	5	2.55
91	17	26	32	75	57	24	39	52	172		1.68
92	4	20	22	46	29	23	45	32	129	3	1.47
93	15	26	22	63	47	22	26	31	126	3	.44
94	23	46	41	110	38	33	40	61	172	5	2.23
95	12	23	48	83	39	35	41	42	157	1	1.22
96	13	24	25	62	53	30	35	46	164	5	1.00
97	20	25	23	68	44	46	35	47	172	2	.80
99	23	36	39	98	69	46	53	76	244	4	1.31
100	20	32	34	86	50	29	29	53	161	3	1.39
101	11	45	34	90	43	39	33	51	166	1	.15
102	7	18	35	60	45	23	32	63	163	1	1.27
103	7	20	21	48	26	15	37	47	125		1.88
104	11	21	38	60	46	36	43	52	177	4	1.85
105	7	12	17	36	16	11	11	23	61	4	1.14
106	10	23	21	54	47	33	31	53	164		1.87
109	18	26	34	78	48	33	34	57	172	2	.21
111	10	13	27	50	53	43	44	49	189	2	1.05
112	16	38	34	86	56	46	52	60	214	5	2.52
113	11	13	30	54	40	40	31	40	151	4	.31
114	16	30	28	74	45	34	41	54	174	5	2.22
116	13	23	19	55	51	17	34	50	152	4	1.21
117	11	13	17	41	27	19	33	43	122	1	.11
118	12	29	39	80	42	39	48	54	183	4	1.31
119	8	31	20	59	42	46	40	40	168	3	.05
120	10	19	16	45	33	31	26	35	125	3	1.05
121	9	21	23	53	46	26	35	57	164	3	1.00
122	18	37	39	94	46	20	38	48	152	2	.00
123	18	37	37	92	51	38	47	54	190	4	.42
124	8	17	16	41	40	25	27	48	140	3	.28
125	18	33	32	83	33	28	31	54	146	3	.69

a) Raw scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1e	2a	2d	3a	3d	4b	4e	5a	5b	6b	6e	7e	7d	8a	8b
126	0	1	1	1	0	1	0	0	1	0	0	1	1	1	1	1
128	1	0	1	0	1	1	0	0	0	0	0	0	0	0	1	0
129	0	0	0	0	0	0	0	-1	0	0	0	0	-1	0	-1	0
130	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	1
131	1	1	0	0	0	0	0	1	0	0	0	0	-1	-1	1	1
132	0	-1	0	-1	-1	0	0	-1	-1	0	0	-1	-1	0	-1	0
133	1	1	0	1	1	1	0	1	1	0	0	1	0	1	1	1
134	1	1	1	1	1	0	0	1	1	0	0	0	0	0	1	1
135	1	1	0	0	0	0	0	1	1	0	0	0	0	1	1	1
136	1	1	0	0	0	0	0	0	1	0	0	0	-1	0	0	-1
137	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0
138	0	1	0	0	0	1	0	1	0	0	-1	-1	0	0	1	1
139	0	1	1	0	0	-1	0	0	1	0	0	1	0	-1	0	-1
140	1	1	1	0	0	1	0	1	1	0	0	0	0	1	0	0
141	1	1	1	1	0	1	0	1	1	0	0	1	0	0	1	0
142	1	0	1	0	1	0	0	0	0	0	0	0	1	1	1	0
143	0	0	0	-1	-1	-1	0	0	0	1	-1	-1	-1	-1	0	-1
144	0	0	0	0	-1	-1	0	0	-1	0	0	-1	-1	-1	0	-1
145	1	1	1	0	1	1	1	0	1	1	0	0	0	1	1	0
146	1	1	0	0	1	0	0	1	0	0	0	1	1	0	1	1
147	0	1	1	0	1	1	0	1	1	0	0	0	0	0	1	0
148	0	1	0	0	-1	0	1	1	-1	0	0	1	0	1	0	0
149	1	1	-1	-1	0	-1	0	1	-1	-1	0	0	-1	-1	-1	-1
150	0	1	1	1	0	0	0	1	1	1	0	0	0	0	1	0
151	1	1	0	0	1	1	0	1	1	0	0	1	0	0	1	1
152	0	-1	-1	-1	0	-1	0	1	0	0	-1	0	0	0	0	-1
153	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0
154	1	1	0	1	1	1	0	0	1	1	0	1	1	1	1	1
156	0	1	1	0	1	1	0	1	1	0	0	0	0	-1	1	1
157	1	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0
158	1	1	1	0	0	1	0	1	0	-1	0	0	0	1	1	1
159	0	0	0	-1	-1	0	-1	0	-1	0	0	-1	0	-1	0	-1
160	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1
161	1	1	1	0	1	0	1	0	1	0	0	1	0	1	1	0
162	0	-1	0	0	-1	0	1	0	1	1	1	0	0	1	0	0

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements																
	9a	9b	10a	10d	11a	11c	12c	12d	13b	13d	14b	14c	15a	15c	16a	16c	T
126	1	0	1	0	1	1	0	1	1	1	0	1	1	1	1	0	21
128	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	1	14
129	0	1	0	1	0	0	0	-1	-1	0	0	0	0	0	0	1	- 2
130	0	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	27
131	1	0	1	0	0	1	1	1	1	0	1	1	1	1	1	0	14
132	-1	0	-1	0	0	0	-1	-1	-1	0	-1	-1	-1	0	-1	0	-17
133	1	0	0	-1	0	0	0	0	0	-1	0	0	1	1	1	0	13
134	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	22
135	0	0	1	1	1	1	1	1	0	0	1	1	1	1	0	-1	16
136	0	0	0	0	0	0	-1	0	1	0	0	-1	1	0	0	0	1
137	1	0	1	0	1	1	1	1	0	0	1	0	1	1	1	1	17
138	1	0	1	1	0	-1	0	1	0	0	0	-1	0	1	1	0	7
139	-1	0	1	1	-1	0	1	0	0	-1	-1	-1	-1	0	-1	0	- 3
140	1	0	0	1	0	1	0	1	0	0	1	0	1	1	1	0	15
141	0	1	1	1	1	1	0	1	1	0	0	0	1	1	1	0	19
142	1	0	1	1	0	0	1	1	1	1	0	0	0	1	1	0	15
147	-1	0	0	-1	-1	-1	0	-1	-1	-1	0	0	0	0	-1	-1	-16
144	0	0	0	0	-1	0	-1	-1	-1	0	-1	-1	0	0	0	0	-13
145	1	0	1	1	1	0	0	1	0	1	1	0	1	1	1	1	21
146	1	0	1	0	0	1	0	1	0	0	1	1	0	1	1	0	16
147	1	0	1	1	0	1	1	1	1	1	0	1	1	1	1	1	20
148	-1	0	0	1	0	0	-1	0	0	1	-1	-1	-1	-1	-1	0	- 2
149	-1	0	1	1	0	1	-1	-1	0	-1	0	0	-1	0	0	0	- 8
150	0	1	1	0	0	0	1	1	1	0	1	1	1	1	1	0	17
151	1	1	1	1	0	1	1	1	1	0	1	1	1	1	1	0	22
152	0	-1	0	0	-1	-1	-1	-1	-1	0	0	-1	-1	-1	-1	0	- 5
153	1	0	1	0	1	1	0	1	0	0	0	1	1	0	1	0	11
154	1	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	24
155	1	0	0	1	1	1	1	1	1	1	1	0	1	1	1	0	19
157	1	1	0	1	1	1	0	1	1	0	0	1	1	1	1	0	16
158	0	0	0	0	0	-1	-1	0	0	1	1	0	0	0	-1	-1	5
159	0	-1	0	1	0	-1	-1	0	0	0	0	-1	0	0	0	-1	-11
160	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	26
161	1	0	1	1	1	0	0	1	0	0	0	0	1	1	1	0	17
162	0	1	0	1	-1	0	-1	0	0	1	-1	-1	0	0	0	0	2

c) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT Part 1	2	3	Total	IHSCE Part 1	2	3	4	Total	HSR	QPI
126	20	44	44	108	56	53	65	61	235	5	2.78
128	14	14	12	40	33	22	26	48	129	4	1.13
129	14	21	32	67	51	21	40	47	159	4	1.92
130	22	40	45	107	66	54	51	68	239	4	1.68
131	14	18	23	55	61	19	42	49	171	3	.94
132	13	17	35	65	36	34	52	46	168	1	1.00
133	6	15	16	37	40	28	37	59	164	2	1.11
134	24	50	46	120	68	44	37	70	227	5	2.27
135			29	72	50	39	33	61	183	2	1.10
136	11	28	22	61	49	34	32	58	173	2	.57
137	4	15	18	37	29	26	32	53	140	1	.44
138	21	40	40	101	68	40	46	70	224	2	.20
139	8	23	24	55	46	23	34	39	139	4	.27
140	17	46	51	114	64	24	29	46	163	5	2.60
141	13	19	23	55	33	21	50	30	134	3	1.50
142	19	41	41	101	40	24	22	40	126	4	1.00
143	11	17	26	54	42	25	26	46	139	1	.35
144	11	18	13	42	42	30	36	47	155	3	1.06
145	16	34	35	85	51	36	52	65	204	3	1.56
146	15	20	42	77	46	41	51	55	193	3	.89
147	16	24	30	70	46	18	33	48	145	2	1.11
148	23	47	48	118	49	38	51	45	183	3	.47
149	11	13	22	46	36	12	31	35	114	1	.00
150	11	29	38	78	31	8	31	33	103	2	1.40
151			22	54	30	14	34	48	126	4	.93
152	30	32	36	88	62	39	45	59	205	2	.89
153	18	23	30	71	45	38	32	51	166	1	.40
154	11	20	21	52	43	30	43	37	153	4	.60
156	12	10	22	44	40	23	27	48	138	4	.46
157	10	25	15	50	31	35	32	51	149	3	.47
158	11	16	24	51	40	34	41	36	151	3	.31
159	9	19	23	51	48	30	40	54	172	3	.50
160	30	34	20	82	55	50	49	53	207	5	1.78
161	15	20	25	60	53	48	58	53	213	5	.90
162	9	12	20	46	32	32	38	41	142	4	.25

a) Raw scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1c	2a	2d	3a	3d	4b	4c	5a	5b	6b	6c	7c	7d	8a	8b
163	1	1	0	1	1	1	0	1	1	0	0	0	0	0	1	1
164	0	0	1	0	0	0	0	1	0	0	-1	0	-1	-1	0	-1
165	1	1	0	-1	1	0	0	1	0	0	-1	0	-1	-1	0	0
166	0	1	0	-1	0	0	0	1	-1	0	0	0	0	1	1	0
167	1	1	0	1	0	1	1	1	1	1	0	1	0	1	0	1
168	0	0	1	0	1	0	0	0	0	0	1	0	0	1	1	0
170	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1
172	0	0	0	1	0	-1	0	0	-1	0	-1	0	0	-1	1	0
173	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	1
174	0	1	1	1	0	0	0	1	1	0	0	0	1	1	1	1
175	0	-1	1	0	0	-1	0	-1	-1	0	0	0	0	0	-1	0
176	1	1	0	-1	1	0	1	1	1	0	1	1	1	1	1	0
177	1	1	1	1	1	0	1	0	1	1	0	1	0	1	1	1
178	1	1	0	0	0	0	0	1	0	0	-1	0	0	0	0	1
179	1	1	-1	-1	-1	-1	-1	0	0	-1	0	0	-1	-1	-1	-1
180	0	0	0	0	0	0	0	0	1	0	0	0	0	-1	0	1
181	0	-1	0	-1	-1	-1	0	0	-1	-1	0	-1	0	0	-1	-1
182	1	1	0	0	1	0	1	1	1	1	0	0	0	0	1	0
183	1	1	1	0	1	1	1	1	1	1	0	1	0	0	1	0
185	0	1	1	0	0	1	0	1	1	1	0	1	1	1	1	1
189	1	1	-1	-1	1	0	0	1	0	0	-1	0	-1	0	-1	0
190	-1	0	1	0	-1	-1	0	0	-1	0	0	0	-1	-1	0	-1
191	0	1	1	1	0	0	0	1	0	0	0	1	0	1	1	0
192	0	0	0	1	-1	-1	0	1	-1	0	1	0	-1	-1	-1	-1
193	0	0	0	0	-1	0	-1	0	-1	-1	-1	0	-1	-1	-1	-1
194	0	0	0	-1	-1	0	-1	0	-1	-1	-1	0	-1	-1	-1	-1
198	1	1	0	0	0	0	0	1	1	0	-1	0	-1	-1	1	1
199	1	1	1	0	1	0	0	1	0	1	0	1	0	0	1	1
201	1	0	1	0	0	0	0	0	1	1	0	0	1	0	1	0
202	0	-1	0	-1	0	0	1	0	1	1	1	0	0	0	1	1
203	0	0	1	0	0	-1	0	0	1	0	1	0	0	0	1	0
204	1	1	1	1	0	0	0	1	1	0	0	0	0	1	1	1
205	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0
207	1	1	1	0	1	1	0	1	1	0	0	0	0	1	1	1
208	1	1	1	0	1	1	0	1	1	0	0	0	0	1	1	1

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements																	
	9a	9b	10a	10d	11a	11c	12c	12d	13b	13d	14b	14c	15a	15c	16c	16d	T
163	0	0	1	1	1	1	0	1	1	0	1	1	1	1	0	0	19
164	1	0	1	1	0	0	-1	0	0	-1	-1	0	-1	0	0	0	- 3
165	0	-1	0	1	-1	0	0	1	-1	-1	0	0	0	0	0	0	- 2
166	-1	0	0	0	0	0	1	1	0	-1	0	0	0	1	0	1	4
167	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	26
168	1	0	1	0	0	1	1	1	1	0	0	0	0	1	0	0	12
170	-1	-1	1	0	0	0	0	1	0	-1	0	-1	0	1	0	-1	2
172	0	0	1	0	0	0	0	1	0	0	-1	0	0	0	0	-1	- 2
173	0	1	1	1	1	1	1	1	0	1	0	0	0	0	0	-1	12
174	0	0	1	0	0	1	1	1	0	0	0	1	0	0	0	0	14
175	-1	0	-1	0	-1	0	-1	-1	0	1	0	-1	-1	-1	-1	0	-12
176	1	0	1	1	1	0	1	0	1	1	1	0	1	1	0	0	20
177	1	1	1	1	1	0	0	1	1	1	0	0	1	1	1	1	24
178	0	0	1	0	0	1	0	1	0	-1	0	-1	0	1	0	-1	4
179	0	-1	1	0	0	0	0	1	0	-1	0	0	0	1	0	-1	- 8
180	0	0	0	1	0	1	0	1	0	0	0	1	0	1	0	0	6
181	-1	-1	-1	0	-1	-1	0	-1	0	-1	-1	-1	-1	-1	-1	-1	-22
182	1	1	0	1	1	0	0	1	0	1	1	1	1	0	0	0	17
183	0	1	0	1	1	0	0	1	0	1	1	1	1	1	1	1	22
185	1	0	1	0	0	1	1	1	0	0	1	1	1	1	1	0	21
189	0	-1	1	0	-1	-1	-1	0	-1	0	-1	-1	0	-1	-1	0	-10
190	0	0	0	0	0	1	-1	0	0	0	0	1	0	0	0	-1	- 6
191	0	1	1	0	0	1	1	1	1	0	0	1	0	1	1	0	16
192	0	-1	0	0	0	-1	-1	0	-1	-1	-1	-1	-1	0	-1	0	-13
193	0	1	0	0	-1	-1	-1	0	0	-1	0	-1	0	0	-1	-1	-15
194	-1	-1	0	0	0	-1	-1	0	-1	-1	-1	0	0	0	-1	0	-18
198	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	5
199	1	0	1	0	0	0	0	0	0	1	1	1	0	0	1	1	16
201	0	0	1	1	0	1	1	1	0	0	0	-1	1	1	1	0	13
202	1	1	1	1	1	0	0	0	0	1	1	1	0	0	0	1	13
203	-1	-1	0	1	0	1	0	1	1	1	0	-1	1	0	0	0	5
204	1	0	1	1	1	1	0	1	0	0	1	0	1	1	0	0	10
205	1	0	1	0	0	1	1	1	1	0	0	1	0	1	1	0	13
207	1	0	1	1	1	1	0	1	0	0	1	1	1	1	1	0	21
208	1	0	1	1	1	1	0	1	0	0	1	1	1	1	1	0	21

c) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT				IHSCE					HSR	QPI
	Part 1	2	3	Total	Part 1	2	3	4	Total		
163	15	41	42	98	48	38	42	50	178	3	1.31
164	13	23	23	59	36	18	33	40	127	1	.00
165	14	20	33	67	43	37	41	52	173	2	.31
166	9	15	27	51	38	21	16	34	109	1	.25
167	23	59	39	121	77	53	51	77	258	5	2.88
168	12	24	38	74	26	10	16	17	69	3	.30
170	4	13	22	49	36	12	26	43	117	1	.00
172	6	16	18	40	43	55	45	34	177	2	.75
173	16	24	33	73	61	34	54	58	207	2	.68
174	8	13	15	36	37	24	37	40	138	5	1.35
175	27	54	47	128	82	44	50	71	247	3	1.31
176	19	34	33	86	51	36	55	56	198	5	2.15
177	25	54	42	121	75	49	46	77	247	5	1.58
178	17	35	33	85	55	35	32	71	193	3	.57
179	7	22	27	56	33	23	27	27	110	3	.69
180	14	21	25	60	46	36	52	43	177	3	.68
181	9	13	20	42	37	15	26	38	116	1	.00
182	20	26	34	80	55	40	50	61	206	3	.55
183	16	21	39	76	33	50	47	73	223	5	1.68
185	13	21	24	58	53	40	28	40	161	4	1.75
189	15	24	30	69	41	50	46	49	186	2	1.50
190	7	13	20	40	28	19	36	36	119	1	.00
191	12	20	30	62	42	30	31	52	155	4	1.61
192	6	16	20	42	34	27	22	39	122	3	.72
193	19	13	11	33	34	29	29	30	122	3	1.61
194	16	39	38	93	65	29	34	61	189	2	.69
198	15	27	39	81	50	30	43	55	178	3	1.46
199	16	23	34	73	31	35	23	39	128	2	2.61
201	27	43	47	117	58	39	42	48	187	1	.00
202	24	35	38	97	64	41	49	69	223	4	1.31
203	17	25	22	64	49	37	41	55	186	3	.36
204	17	44	47	108	54	37	31	58	180	4	1.89
205	10	22	19	51	34	33	36	59	162	2	.20
207	22	40	32	94	61	44	27	48	180	5	2.22
208	22	50	46	118	69	45	49	56	219	5	1.88

a) Raw scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1e	2a	2d	3a	3d	4b	4e	5a	5b	6b	6e	7a	7d	8a	8b
209	1	1	0	0	0	1	1	1	1	1	0	1	0	1	1	0
210	1	0	0	1	1	0	0	0	-1	-1	1	0	-1	-1	0	-1
214	0	1	1	0	0	-1	0	1	1	0	0	1	0	1	1	1
215	0	1	1	1	1	0	0	1	1	0	0	1	1	0	1	1
216	1	0	1	1	-1	0	1	0	-1	0	0	1	0	1	0	1
217	1	1	1	0	1	1	0	1	1	0	0	-1	-1	1	1	1
218	1	1	0	0	0	1	0	1	0	1	0	1	0	0	0	1
219	-1	-1	0	-1	0	1	0	0	0	-1	0	0	0	1	1	0
220	0	1	0	0	1	1	0	1	-1	0	0	0	0	0	0	1
221	0	0	0	0	-1	0	0	0	0	1	-1	0	0	-1	0	-1
222	0	1	0	0	0	-1	0	0	-1	0	0	0	-1	-1	1	1
223	0	-1	0	-1	-1	-1	1	0	-1	0	-1	0	-1	0	0	-1
224	0	0	0	0	0	0	0	1	0	0	0	0	0	-1	0	-1
226	0	1	0	0	0	0	0	1	-1	-1	0	0	-1	0	1	0
227	0	1	0	0	0	0	0	1	1	0	0	0	0	0	1	1
228	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	1
229	0	1	1	1	0	0	0	1	1	0	0	0	0	0	1	0
231	1	1	0	0	0	1	0	1	1	0	0	0	1	1	1	1
232	1	1	0	0	1	1	0	0	1	1	0	1	1	1	1	1
234	0	1	1	1	1	1	0	0	0	0	0	1	0	1	1	0
235	0	0	0	-1	0	1	1	0	1	1	0	-1	0	1	1	0
236	0	1	1	0	1	0	0	0	0	0	1	1	1	1	0	1
237	1	1	0	1	0	1	1	1	1	1	0	1	0	1	1	1
238	1	1	1	1	1	1	0	1	0	0	0	0	0	0	1	0
239	0	-1	-1	0	-1	-1	1	0	-1	0	0	0	-1	-1	-1	-1
240	1	1	1	0	1	1	1	0	1	0	0	1	0	1	1	1
241	0	-1	0	-1	0	-1	1	0	-1	0	-1	0	0	-1	-1	-1
242	0	1	0	0	0	1	0	0	-1	0	0	0	1	1	1	0
243	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	-1
244	1	1	0	-1	1	0	1	0	-1	-1	-1	-1	-1	-1	-1	-1
245	0	0	0	-1	0	1	0	0	-1	0	-1	0	-1	0	0	0
246	1	1	1	0	1	0	0	1	0	0	0	0	1	1	1	0
247	1	1	-1	0	1	0	0	1	1	0	0	1	0	0	0	0
248	1	1	0	0	0	1	0	0	1	0	0	1	0	1	1	1
249	0	-1	0	-1	0	0	1	0	0	0	0	-1	-1	0	0	0

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	9a	9b	10a	10d	11a	11c	12c	12d	13b	13c	14b	14c	15a	15c	16c	16d	T
								Elements									
209	1	0	1	1	1	1	1	1	1	1	0	1	1	0	1	0	22
210	0	0	1	0	0	1	1	0	-1	-1	0	1	0	0	0	0	1
214	-1	0	1	0	0	1	1	1	0	1	1	0	0	0	0	1	13
215	0	1	1	1	1	1	0	1	0	0	0	1	0	0	0	0	17
216	1	0	1	0	1	0	-1	0	0	-1	0	-1	0	-1	1	0	5
217	1	1	1	1	1	1	0	1	1	0	1	0	1	1	1	0	21
218	1	0	1	0	0	1	0	1	1	0	0	1	[illegible]	1	1	0	15
219	1	1	0	1	0	1	1	1	0	-1	0	0	1	0	0	-1	4
220	0	-1	1	0	1	1	0	1	0	0	0	0	0	1	0	-1	7
221	-1	-1	0	0	-1	-1	0	0	-1	-1	-1	0	0	0	-1	0	-11
222	0	0	1	0	0	1	1	1	1	0	0	-1	0	1	-1	0	3
223	-1	-1	0	0	0	-1	0	-1	-1	0	-1	-1	-1	0	-1	0	-16
224	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	0	3
226	0	-1	0	-1	0	0	0	1	0	-1	0	-1	0	0	0	0	-3
227	1	0	1	0	1	1	0	1	0	0	0	0	0	0	1	0	11
228	0	0	1	0	1	1	0	1	0	1	0	1	1	1	1	0	14
229	1	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	13
231	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0	22
232	1	1	1	0	1	0	0	1	1	0	0	0	1	1	0	0	19
234	1	1	1	1	1	1	0	1	0	1	0	1	1	1	1	1	21
235	1	0	0	0	0	-1	-1	-1	-1	0	-1	-1	0	-1	1	0	-1
236	0	0	1	0	0	1	0	1	1	0	0	1	1	1	1	1	17
237	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	25
238	1	1	1	1	0	1	1	1	1	0	0	0	1	1	0	1	19
239	-1	0	0	-1	-1	-1	0	-1	-1	-1	-1	0	-1	-1	-1	-1	-20
240	1	0	1	1	1	0	0	1	0	1	1	0	1	1	1	1	22
241	-1	0	0	0	0	0	0	-1	0	1	-1	0	0	0	-1	0	-10
242	0	0	0	0	1	1	0	1	1	0	-1	0	0	1	0	0	8
243	1	1	1	1	1	1	0	1	1	0	0	-1	1	1	1	0	12
244	0	-1	0	1	0	-1	-1	0	-1	-1	0	0	-1	0	-1	-1	-14
245	-1	0	1	0	-1	0	0	1	1	0	0	1	0	1	0	0	0
246	1	0	0	-1	0	1	1	1	1	0	0	0	1	1	1	0	15
247	1	0	1	1	1	0	1	1	1	1	0	0	1	1	0	0	15
248	1	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	20
249	0	0	0	1	0	0	0	-1	0	1	0	-1	0	-1	0	1	-3

e) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT				IHSCE					HSR	QPI
	Part			Total	Part				Total		
	1	2	3		1	2	3	4			
209	18	35	39	92	38	29	35	41	133	4	1.34
210	3	21	22	46	22	16	14	24	76	2	.76
214	15	27	34	76	45	28	41	49	163	3	.64
215	12	29	33	74	55	44	40	51	190	3	.47
216	15	36	25	76	58	37	43	55	193	3	1.31
217	25	45	45	116	66	34	51	75	206	4	1.31
218	15	22	30	67	32	26	34	52	144	5	.94
219	13	16	25	54	42	27	33	37	139	3	.62
220	16	30	28	74	43	31	67	43	184	3	1.64
221	12	31	32	75	30	29	35	39	133	2	1.12
222	14	16	25	55	36	30	26	31	123	3	1.66
223	8	14	22	44	34	24	28	20	106	1	.27
224	3	24	18	45	40	16	19	44	119	1	.76
226	11	20	22	53	31	42	40	59	172	2	.52
227	8	21	25	54	50	42	34	51	177	3	1.27
228	12	22	29	63	51	39	51	70	211	3	2.10
229	7	20	24	51	37	23	30	32	122	4	.88
231	25	50	30	103	64	54	47	60	225	5	2.57
232	16	23	31	70	56	39	37	58	190	4	1.55
234	28	56	50	134	67	49	29	64	209	5	3.00
235	20	25	44	69	64	34	50	75	223	5	1.36
236	23	31	26	80	49	25	55	56	185	4	.82
237	24	56	44	124	65	49	59	80	253	5	1.42
238	9	19	26	54	29	26	29	26	110	5	.42
239	18	35	41	94	51	37	34	48	170	1	1.77
240	14	43	36	93	51	45	53	57	186	5	2.00
241	10	19	31	60	40	48	37	36	161	2	1.18
242	7	13	21	41	35	16	14	37	102	3	.83
243	12	17	29	58	38	34	38	55	164	4	1.70
244	16	20	26	71	44	39	35	31	149	3	.71
245	21	44	31	96	36	25	54	54	169	4	.68
246	14	24	30	68	49	23	49	56	177	4	.52
247	13	24	35	72	46	16	59	47	168	4	1.93
248	17	43	30	90	48	27	43	72	190	3	1.52
249	15	39	39	93	41	50	50	50	191	5	2.66

a) Raw scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1c	2a	2d	3a	3d	4b	4c	5a	5b	6b	6c	7c	7d	8a	8b
250	1	1	1	1	1	1	0	1	1	0	1	0	0	1	1	1
252	0	0	0	1	-1	-1	0	1	-1	0	1	0	0	-1	-1	-1
253	0	1	1	0	0	-1	0	0	0	0	0	0	0	0	1	0
254	0	1	0	-1	0	0	0	1	0	-1	-1	-1	0	0	0	1
255	1	0	1	0	1	0	0	1	0	0	0	0	0	1	1	0
256	1	1	0	1	0	1	-1	0	1	0	1	0	0	1	1	1
257	0	1	0	-1	1	1	1	1	1	1	0	1	0	1	1	0
258	1	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0
259	1	1	0	1	0	1	1	1	1	1	1	0	0	1	1	1
261	0	-1	0	0	1	0	0	1	0	0	0	-1	0	-1	1	0
260	0	1	0	0	0	1	0	1	0	0	-1	0	-1	0	1	1
262	0	0	1	0	0	1	0	0	0	-1	-1	0	-1	-1	0	-1
263	1	1	1	0	0	1	1	1	1	1	0	1	0	0	1	1
264	-1	0	1	0	-1	-1	-1	-1	-1	-1	0	0	-1	-1	0	-1
265	1	0	0	1	0	0	0	0	-1	0	-1	0	0	-1	1	1
266	0	1	0	0	0	0	0	1	0	0	0	0	-1	0	1	1
267	1	1	0	1	1	0	0	1	0	0	1	1	1	1	1	0
268	1	0	1	1	0	-1	0	0	0	1	1	0	1	1	0	-1
269	0	0	0	0	-1	0	0	0	0	1	0	0	-1	-1	-1	-1
271	0	1	0	0	1	0	0	1	0	0	0	0	0	1	1	1
272	1	1	0	0	1	1	1	1	1	0	0	1	0	1	1	1
273	0	0	0	-1	-1	0	0	0	0	1	1	0	0	0	1	0
274	0	1	0	-1	0	1	0	1	1	0	-1	0	0	1	1	1
275	0	1	0	0	0	0	0	1	0	0	0	0	-1	0	1	1
276	0	1	0	1	0	1	1	0	1	1	1	1	0	1	1	1
277	1	0	0	0	0	1	-1	0	-1	0	-1	0	-1	-1	1	0
278	0	0	0	0	0	0	1	0	-1	0	0	0	1	1	0	-1
279	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1
280	0	1	0	0	0	0	0	1	0	1	0	-1	0	0	0	0
281	0	0	-1	0	-1	-1	0	0	-1	-1	0	0	-1	-1	0	-1
283	1	1	0	1	1	0	1	1	1	0	0	1	0	0	1	0
284	1	1	1	0	1	1	0	1	0	0	0	0	0	0	1	1
285	1	0	-1	0	0	-1	0	1	-1	-1	-1	0	0	0	0	-1
287	0	1	1	0	1	0	0	0	1	0	0	1	0	0	1	1
288	0	-1	0	0	-1	0	0	0	-1	0	0	0	-1	-1	-1	0

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements																
	9a	9b	10a	10d	11a	11e	12e	12d	13b	13d	14b	14e	15a	15e	16e	16d	T
250	0	1	1	1	0	1	0	1	1	1	1	1	1	1	0	1	24
252	0	0	1	0	-1	-1	-1	0	0	-1	0	-1	-1	0	0	1	- 7
253	0	-1	0	0	0	0	0	-1	0	0	-1	-1	0	1	0	0	- 1
254	0	-1	0	0	0	1	0	1	-1	-1	0	-1	0	0	-1	-1	- 5
255	1	1	1	1	0	1	0	1	0	0	0	0	0	1	1	1	15
256	1	1	1	1	0	1	0	1	1	0	0	0	0	1	0	-1	15
257	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	23
258	0	0	1	1	0	1	0	1	1	0	0	1	0	1	1	0	15
259	1	0	1	1	1	0	1	1	1	1	1	0	1	1	0	0	23
261	0	-1	1	0	0	1	-1	0	0	0	0	-1	1	1	-1	0	0
260	0	-1	1	1	0	0	0	1	0	-1	0	0	0	1	0	1	6
262	-1	0	0	-1	0	1	0	0	0	-1	0	0	0	1	0	0	- 4
263	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	26
264	-1	0	0	-1	0	-1	-1	0	-1	-1	0	0	-1	-1	-1	0	-10
265	-1	0	0	0	-1	0	1	0	1	0	-1	-1	0	0	0	0	- 1
266	1	1	1	0	1	0	0	1	1	0	-1	-1	0	1	1	0	9
267	0	0	0	1	0	1	0	1	1	0	1	0	1	1	1	0	18
268	0	1	0	1	0	1	0	1	0	1	1	0	0	1	1	1	14
269	0	-1	1	1	0	0	0	-1	0	-1	-1	-1	0	-1	-1	0	- 9
271	1	1	1	0	1	0	1	1	1	0	1	1	1	1	1	0	18
272	1	1	1	1	1	1	0	1	0	1	1	1	1	0	1	0	23
273	0	1	0	1	0	1	-1	0	1	1	1	0	0	0	0	1	7
274	0	0	1	1	1	1	0	1	1	1	1	0	0	1	1	0	15
275	1	1	1	0	0	0	0	1	0	-1	0	0	1	1	1	0	9
276	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	22
277	1	0	0	0	0	-1	-1	0	-1	0	-1	-1	-1	-1	1	0	- 7
278	-1	0	0	1	0	-1	-1	0	0	1	-1	-1	0	-1	0	1	- 2
279	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	26
280	0	-1	1	0	0	1	0	1	0	0	0	0	0	1	1	0	6
281	0	-1	0	0	-1	0	-1	-1	0	-1	0	-1	0	0	0	0	-13
283	1	0	0	0	1	0	1	1	1	1	0	1	1	1	1	-1	20
284	1	0	1	0	0	1	0	1	0	0	0	0	1	1	0	-1	13
285	0	0	0	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-15
287	1	0	1	1	1	0	1	1	1	0	1	1	0	0	1	0	17
288	-1	0	-1	0	-1	0	0	0	-1	-1	0	1	-1	-1	-1	-1	-14

c) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT Part 1	2	3	Total	IHSCE Part 1	2	3	4	Total	HSR	QPI
250	25	45	42	112	51	44	32	50	177	4	2.05
252	18	25	42	85	70	41	43	77	240	4	.89
253	12	8	20	40	35	20	27	42	124	2	1.41
254	13	23	27	63	30	33	31	50	160	1	.57
255	18	40	39	87	54	33	40	62	135	5	2.45
256	22	41	44	107	51	37	60	71	219	5	1.52
257	25	42	42	114	58	58	66	58	240	5	2.15
258	19	36	32	86	37	13	31	49	130	3	2.12
259	11	17	26	64	32	41	26	41	160	5	1.62
261	11	22	33	66	30	32	49	59	178	1	1.52
260	18	34	43	95	33	35	25	40	133	-	1.57
262	15	17	20	52	36	10	24	28	100	2	.50
263	25	46	52	123	77	53	42	65	237	4	1.77
264	9	27	24	60	29	7	9	21	66	1	.37
265	9	13	15	37	34	28	39	36	137	3	.25
266	13	24	26	63	55	26	44	60	185	3	1.23
267	8	19	24	51	43	27	44	42	156	4	1.41
268	17	30	50	97	58	31	38	49	176	5	1.26
269	17	34	30	81	26	8	15	29	78	4	1.31
271	9	16	27	52	32	26	32	42	132	2	.94
272	11	24	23	58	33	30	20	35	118	3	1.87
273	13	24	22	59	52	14	31	51	148	3	.64
274	26	44	40	120	70	54	63	71	258	3	1.15
275	12	22	37	71	47	29	51	49	176	5	1.61
276	21	41	39	101	57	39	56	52	204	5	.85
277	15	18	20	53	56	20	38	54	168	3	.64
270	22	42	41	105	50	30	41	53	168	5	1.81
279	16	43	33	92	54	40	49	60	211	5	1.05
280	8	13	27	49	40	36	30	51	157	1	.08
281	19	18	16	53	33	19	30	39	121	3	.66
283	25	45	46	116	60	43	49	61	213	5	1.63
284	2	12	19	36	32	22	25	35	115	3	.83
285	11	33	27	73	32	20	30	23	116	1	1.05
287	3	20	23	46	33	11	21	16	81	3	.87
288	6	21	18	45	29	20	19	26	94	1	.00

a) Raw scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1e	2a	2d	3a	3d	4b	4e	5a	5b	6b	6e	7a	7d	8a	8b
289	0	0	1	0	1	0	1	1	-1	-1	1	0	0	0	1	1
291	0	1	1	0	1	0	0	0	-1	0	1	0	0	0	1	0
292	-1	0	1	0	-1	0	0	0	1	0	1	0	0	1	0	-1
293	1	0	0	1	1	1	-1	0	0	0	0	0	0	0	1	0
294	-1	-1	0	-1	-1	-1	1	0	-1	0	-1	-1	0	-1	-1	-1
296	0	0	1	1	-1	0	0	1	0	1	0	-1	-1	0	-1	-1
297	0	1	1	0	1	1	0	1	0	0	0	0	0	1	1	1
298	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	1
299	1	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1
300	0	-1	0	-1	-1	-1	0	0	0	0	0	-1	-1	0	-1	0
301	1	1	0	-1	0	0	0	1	0	-1	-1	0	-1	-1	0	1
302	1	0	0	0	0	-1	0	1	-1	0	0	0	-1	0	1	1
303	1	1	0	0	0	0	-1	0	0	-1	-1	-1	-1	0	1	1
304	0	1	1	0	0	1	0	0	-1	0	0	0	0	0	1	0
305	1	1	0	-1	0	-1	0	0	0	-1	0	1	1	1	1	0
307	1	1	1	1	1	0	0	0	-1	0	0	0	0	0	1	0
308	0	1	0	0	0	0	-1	0	0	-1	-1	0	-1	-1	1	1
309	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0
310	-1	0	0	0	1	0	0	1	0	-1	0	0	0	0	1	0
311	0	0	1	1	-1	0	1	0	1	0	0	1	0	-1	0	1
312	1	1	1	0	0	0	0	1	0	0	0	0	0	-1	1	1
314	-1	0	1	0	-1	-1	-1	0	-1	0	-1	0	-1	-1	0	-1
315	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	1
316	1	1	0	0	0	0	0	1	0	0	0	0	-1	0	1	1
317	1	1	0	1	1	0	0	1	1	0	0	0	0	-1	0	-1
319	0	1	0	-1	0	0	-1	0	-1	-1	-1	0	-1	-1	1	0
320	0	0	0	-1	0	-1	0	1	-1	-1	-1	0	0	0	0	0
322	1	1	1	0	0	0	0	1	1	0	0	0	1	1	1	1
323	0	0	0	0	0	0	-1	-1	0	0	1	0	-1	0	0	1
324	0	-1	0	-1	0	-1	0	1	-1	0	0	0	0	0	0	-1
325	-1	-1	0	0	-1	0	1	0	-1	-1	0	-1	0	-1	-1	0
326	1	1	0	0	1	0	0	1	1	0	0	0	0	0	1	0
327	0	1	1	1	1	0	0	0	1	0	0	0	0	0	1	0
328	0	0	1	0	-1	-1	-1	0	-1	0	-1	0	-1	-1	-1	0
329	0	1	1	0	0	1	0	0	1	0	0	1	0	0	0	1

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements																
	9a	9b	10a	10d	11a	11c	12c	12d	13b	13d	14b	14c	15a	15c	16c	16d	T
289	0	1	1	1	0	0	1	1	0	1	1	0	1	1	1	0	15
291	1	0	1	1	1	0	0	1	1	0	0	-1	1	1	0	0	11
292	0	1	1	1	1	0	0	1	1	0	1	0	1	1	0	-1	9
293	-1	-1	1	0	0	1	-1	-1	0	-1	-1	-1	0	1	1	1	2
294	-1	0	-1	0	-1	0	0	-1	-1	0	-1	-1	-1	0	-1	-1	-20
295	0	0	1	0	0	1	-1	0	-1	0	-1	0	-1	0	-1	-1	- 5
297	1	0	1	1	1	1	1	0	1	0	1	1	1	1	1	0	20
298	0	1	1	0	0	1	1	1	0	1	0	1	1	1	1	1	16
299	1	0	1	1	1	1	0	1	1	0	1	0	1	1	1	0	16
300	0	1	-1	0	0	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-17
301	0	-1	0	1	0	0	0	1	-1	0	0	-1	0	1	0	-1	- 2
302	1	1	1	0	1	1	-1	0	0	0	0	-1	0	0	0	0	4
303	-1	0	1	0	0	-1	-1	0	-1	0	0	-1	0	1	1	0	- 3
304	1	1	1	1	0	1	1	0	0	0	0	0	1	1	1	0	12
305	0	0	0	1	1	0	0	1	1	0	1	1	1	1	1	0	12
307	0	1	1	1	0	1	0	1	0	1	0	-1	1	1	1	1	14
308	1	0	1	0	0	-1	0	1	0	-1	0	-1	0	1	1	0	0
309	0	1	1	0	1	1	0	1	0	0	0	1	1	1	1	0	12
310	1	0	1	1	0	0	0	1	0	-1	1	0	1	1	1	0	8
311	0	1	1	0	0	0	0	0	0	1	-1	-1	0	0	0	1	5
312	0	0	0	0	0	1	0	1	0	0	0	0	1	1	1	1	11
314	0	-1	0	0	0	-1	0	-1	-1	0	0	0	-1	0	0	0	-13
315	1	1	1	1	1	0	1	1	1	0	0	1	0	1	1	0	24
316	1	1	1	0	0	1	0	1	1	0	0	0	1	1	1	0	13
317	0	-1	1	0	0	0	0	1	0	0	1	1	0	1	0	0	8
319	0	-1	0	-1	-1	-1	0	1	-1	0	-1	0	0	-1	1	0	-10
320	0	-1	1	1	-1	-1	-1	0	-1	-1	0	-1	-1	0	-1	-1	-12
322	1	0	1	1	0	1	1	1	1	0	1	1	0	1	1	0	20
323	-1	0	-1	0	0	0	0	-1	-1	0	0	-1	0	0	-1	-1	- 8
324	0	0	1	0	-1	0	0	-1	-1	0	-1	0	-1	0	0	-1	- 9
325	0	0	0	1	0	1	0	-1	1	0	0	-1	-1	0	-1	0	- 8
326	0	0	1	1	1	0	0	1	0	0	1	0	1	1	1	0	14
327	0	1	0	0	1	0	0	1	1	0	0	1	1	1	1	0	14
328	-1	-1	1	1	0	-1	-1	0	-1	-1	-1	-1	0	0	0	-1	-14
329	1	1	0	-1	1	1	1	1	1	0	1	0	0	1	1	0	15

e) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT				IHSCE					HSR	QPI
	Part			Total	Part				Total		
	1	2	3		1	2	3	4			
289	19	29	28	76	50	37	45	54	187	5	.68
291	14	23	35	72	34	41	44	46	165	4	.52
292	16	26	36	78	41	34	46	51	172	5	2.63
293	13	15	18	46	41	19	35	59	154	3	1.83
294	18	30	39	87	56	42	44	40	182	2	.60
296	5	15	19	39	43	27	41	60	171	1	.88
297	15	17	32	64	34	31	34	34	133	3	.64
298	26	38	30	94	48	22	36	41	147	5	2.27
299	10	33	24	67	50	28	53	47	178	3	.68
300	13	18	27	58	37	20	24	42	123	4	1.55
301	9	17	26	42	47	29	45	56	177	3	2.05
302	9	20	31	60	45	30	36	49	160	4	.73
303	17	22	26	65	31	22	29	37	119	1	1.87
304	8	29	27	64	42	42	27	43	155	5	.73
305	21	28	35	84	53	14	26	36	129	1	.00
307	11	15	20	46	50	28	23	46	147	3	.64
308	14	15	21	50	40	17	40	49	146	1	1.35
309	12	13	24	49	37	27	32	37	133	2	1.00
310	12	30	20	62	37	29	30	42	138	1	.94
311	15	26	31	72	49	38	34	45	166	2	.57
312	11	23	24	58	46	37	39	52	174	3	1.57
314	11	21	14	46	49	32	43	56	180	4	1.35
315	15	33	29	77	35	35	40	53	163	5	1.31
316	7	16	23	46	43	32	28	42	145	2	.20
317	8	25	21	54	27	23	20	31	101	3	.50
319	5	12	17	34	30	16	27	27	100	3	.23
320	11	16	33	60	47	23	41	54	165	1	.78
322	10	15	32	57	35	31	30	38	134	3	.68
323	16	17	28	61	58	36	41	50	185	3	1.58
324	14	29	24	67	47	49	36	48	180	1	.00
325	6	10	21	37	46	16	29	34	125	1	.00
326	19	25	32	76	72	25	19	54	170	3	1.94
327	10	17	17	44	41	43	37	44	165	3	.00
328	12	15	28	55	28	32	24	25	109	2	.14
329	15	28	33	76	35	32	31	30	128	4	1.11

a) Raw scores achieved on eighteen elements, Grade 1 to 8, in The University of Scranton Student Description Sheet, by 342 Freshmen (1950-1955) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1c	2a	2c	3a	3c	4b	4c	5a	5b	6b	6c	7b	7c	8a	8b
330	1	1	0	-1	0	0	0	1	0	0	-1	0	-1	0	1	1
331	1	1	0	1	0	0	0	1	1	0	0	1	1	1	1	1
332	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1
333	0	-1	0	-1	0	-1	-1	-1	-1	-1	-1	-1	0	-1	-1	-1
334	0	1	0	-1	-1	0	0	0	0	-1	0	0	0	0	-1	0
335	1	1	1	1	1	0	1	1	1	1	0	1	0	1	1	0
336	1	1	1	0	0	0	0	1	0	0	0	0	0	0	1	1
334	1	1	0	-1	0	0	0	0	1	0	-1	0	-1	0	1	1
335	1	0	1	0	0	0	0	0	1	1	1	1	0	1	1	1
336	0	1	1	0	1	1	1	1	1	0	1	1	0	1	1	0
337	0	0	-1	0	-1	-1	0	1	0	-1	0	0	-1	-1	-1	-1
338	1	1	0	0	0	1	0	0	1	0	0	1	1	0	1	0
339	0	1	1	0	0	0	0	0	1	1	0	0	0	-1	1	0
340	0	-1	1	1	-1	0	0	0	-1	0	1	0	-1	0	0	-1
342	0	1	0	0	0	0	0	0	0	0	0	1	0	-1	0	0
346	0	1	1	1	1	1	0	0	0	0	0	1	0	1	1	1
347	1	1	0	0	1	0	0	0	1	0	0	0	1	0	1	0
348	1	1	0	0	1	0	0	0	-1	-1	0	-1	-1	-1	0	0
349	1	1	1	0	1	0	0	1	1	0	0	1	1	1	1	0
350	0	1	0	0	0	0	0	0	-1	-1	0	0	0	-1	1	0
351	1	1	0	0	0	0	0	1	0	0	0	0	0	1	1	1
352	1	0	0	0	0	-1	-1	-1	-1	-1	0	-1	-1	0	0	-1
353	0	1	1	0	0	0	0	1	-1	0	0	0	0	-1	0	-1
354	1	1	0	0	0	0	0	1	0	0	0	0	-1	0	-1	0
355	-1	0	0	-1	-1	0	1	0	0	0	0	-1	-1	-1	0	0
356	1	1	0	0	1	0	0	1	1	0	0	1	0	0	1	1
357	1	1	1	0	1	0	1	0	1	0	1	1	1	1	1	0
358	1	1	1	0	1	0	0	0	1	0	0	1	0	0	1	0
359	1	0	-1	0	0	1	0	1	0	1	0	0	0	0	1	0
360	0	1	0	-1	1	0	0	1	0	1	0	-1	0	0	0	-1
362	0	-1	1	0	1	0	0	0	-1	-1	0	0	-1	0	-1	0
363	0	-1	0	0	0	0	0	0	0	0	0	-1	0	-1	1	0
364	-1	0	1	0	1	0	0	0	0	-1	0	1	1	1	1	0
365	0	1	1	0	1	1	0	1	0	-1	0	0	0	1	0	0
366	1	1	1	0	1	0	1	1	1	0	0	1	0	1	1	1

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 Freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements																	
	9a	9b	10a	10d	11a	11e	12e	12d	13b	13d	14b	14e	15a	15e	16e	16d	I
330	1	0	1	1	-1	0	0	1	0	-1	0	0	0	1	0	0	5
331	0	1	0	1	0	1	1	1	1	0	0	1	0	1	0	0	10
332	1	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	28
333	-1	-1	0	1	0	-1	0	-1	-1	0	-1	0	0	0	-1	-1	-19
334	-1	0	0	-1	-1	0	-1	0	-1	0	0	-1	-1	0	-1	0	-11
335	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22
336	1	0	1	1	1	1	0	1	1	0	0	1	1	1	1	0	17
334	1	0	1	1	1	0	0	1	0	0	0	0	0	1	0	0	8
335	0	0	1	1	0	0	1	1	1	1	0	0	0	1	1	0	17
336	1	0	1	0	1	1	0	1	1	1	1	0	1	1	1	0	22
337	-1	0	1	0	0	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	0	-16
338	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	17
339	0	1	0	0	1	0	1	1	0	1	0	1	0	0	0	0	10
340	0	0	1	1	0	-1	0	1	-1	0	0	0	0	0	0	0	- 1
342	1	0	1	1	0	1	0	1	0	-1	0	0	0	1	0	0	6
346	1	1	1	0	1	0	0	1	0	0	0	1	0	1	0	0	16
347	1	0	1	0	1	1	1	1	0	0	0	0	0	1	1	1	15
348	0	1	1	1	-1	0	0	1	0	-1	-1	-1	1	0	0	0	- 1
349	1	1	1	1	0	1	0	1	1	0	1	0	1	1	1	0	21
350	1	1	1	0	0	1	1	1	0	-1	0	1	0	0	0	-1	4
351	1	0	1	1	0	1	0	1	0	0	1	0	0	0	1	0	13
352	1	0	1	1	1	0	-1	-1	-1	0	1	0	-1	0	0	0	- 6
353	1	1	1	0	0	1	0	1	0	-1	1	0	1	1	0	1	8
354	0	1	0	1	0	0	0	1	0	1	0	0	1	1	1	1	9
355	0	0	0	1	-1	0	-1	0	1	1	-1	-1	0	0	0	0	- 6
356	1	0	1	1	0	0	0	1	1	0	1	0	1	1	1	0	17
357	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	26
358	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	0	19
359	1	0	0	1	1	1	0	1	0	0	0	0	0	1	0	0	10
360	0	0	1	1	1	1	0	1	1	0	0	0	0	1	1	1	0	10
362	-1	0	0	-1	-1	-1	0	-1	-1	0	0	-1	-1	-1	-1	0	-13
363	-1	0	0	0	0	1	0	-1	0	0	0	0	0	0	0	1	- 2
364	1	1	1	1	1	1	0	1	0	0	0	0	1	1	0	0	13
365	1	1	1	0	1	1	0	1	1	0	0	1	1	1	1	0	16
366	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	0	24

e) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT); also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT				IHSCE					HSR	QPI
	Part			Total	Part				Total		
	1	2	3		1	2	3	4			
330	16	33	31	80	54	29	45	66	194	2	.68
331	14	26	31	71	39	41	39	40	159	5	1.47
332	21	39	49	109	45	48	46	59	198	5	2.57
333	12	24	26	62	37	26	39	43	145	1	.00
334	12	25	26	63	18	25	32	34	109	1	1.43
335	18	37	33	88	75	49	43	71	238	5	2.64
336	13	34	26	73	42	34	45	43	164	3	.00
334	21	26	35	82	56	33	36	76	201	3	1.21
335	21	24	41	86	53	35	55	56	199	5	1.52
336	18	53	44	115	64	36	36	70	206	5	1.78
337	13	26	24	63	31	28	24	37	120	1	1.13
338	14	19	27	60	45	33	40	57	185	4	1.23
339	17	31	38	86	58	49	54	60	221	4	.94
340	12	18	23	53	37	24	31	45	137	3	.70
342	25	42	42	109	50	25	26	46	147	3	1.75
346	16	30	30	76	62	10	31	46	149	4	.66
347	7	13	21	41	26	20	20	46	112	5	1.23
348	9	15	23	47	25	27	27	40	119	1	1.27
349	7	22	26	55	44	30	48	63	185	4	1.61
350	9	12	16	37	30	29	21	27	107	4	.13
351	17	32	38	87	41	20	31	40	132	4	1.23
352	18	23	22	63	48	41	37	53	179	4	1.17
353	17	27	26	70	63	37	41	55	196	3	.76
354	23	25	39	87	49	20	42	70	181	3	.85
355	17	18	26	61	75	31	48	69	223	3	1.00
356	7	21	25	53	37	19	37	39	132	4	1.58
357	22	47	44	113	50	42	52	44	197	5	1.88
358	10	23	16	49	37	12	31	44	124	5	2.06
359	8	18	14	40	34	34	29	34	131	2	.52
360	7	12	19	38	43	28	29	35	135	3	1.34
362	13	33	20	66	47	26	32	59	164	2	1.37
363	16	23	31	70	52	43	51	57	203	2	.50
364	14	22	34	70	55	29	49	55	188	2	.66
365	7	21	23	51	33	21	22	45	121	4	.23
366	18	33	36	87	55	51	42	57	205	4	1.24

a) Raw scores achieved on significant elements, tetrads 1 to 8, in The University of Scranton Student Description Sheet, by 342 freshmen (1950-1959) of the University of Scranton. (Cont'd.)

Student	Elements															
	1b	1c	2a	2d	3a	3d	4b	4c	5a	5b	6b	6c	7c	7d	8a	8b
367	0	-1	1	1	0	1	1	0	-1	0	0	-1	-1	0	-1	0
368	1	0	0	0	0	0	0	1	0	-1	0	0	-1	-1	1	0
369	1	0	1	0	0	-1	0	1	0	0	-1	0	-1	0	1	1
370	0	1	1	1	1	0	0	1	1	0	0	0	1	0	1	0
371	0	-1	-1	0	0	0	1	0	-1	-1	-1	-1	-1	0	0	-1
372	1	1	1	0	1	1	0	1	0	0	0	1	0	-1	1	0
373	1	1	-1	0	0	-1	0	0	1	0	0	-1	1	1	1	0
374	1	0	1	0	0	1	0	1	1	0	0	0	0	0	1	1
375	0	1	0	1	0	0	0	0	0	-1	0	1	0	0	1	0
376	1	1	0	0	0	0	1	1	1	0	0	0	0	0	1	1
377	1	1	0	0	0	0	1	0	1	0	0	1	0	0	1	1
378	1	1	0	0	0	0	0	0	1	0	-1	0	-1	-1	0	0
379	0	0	0	0	-1	0	0	0	-1	-1	-1	-1	0	-1	0	0
380	0	1	1	0	1	1	1	1	1	0	0	1	0	1	1	1
381	1	1	0	1	1	1	0	1	1	0	0	0	1	0	1	1
382	0	-1	1	0	1	0	0	1	0	1	0	-1	-1	0	0	1
383	0	1	0	0	0	1	0	1	0	-1	-1	-1	0	1	0	1
384	1	1	0	0	0	0	0	0	-1	0	0	0	0	0	1	0
385	0	1	1	0	1	0	0	0	-1	0	0	0	0	0	1	1
386	1	1	0	0	1	0	0	1	1	0	0	0	0	0	1	1
387	1	1	0	0	1	1	0	1	0	0	0	0	0	0	1	1
388	0	1	0	0	1	0	0	0	0	0	1	0	1	1	1	0
389	1	1	1	0	1	1	1	1	1	0	0	0	0	1	1	1
390	1	1	0	-1	1	0	0	1	0	0	-1	0	0	1	0	-1
391	0	1	0	-1	0	1	1	1	0	1	-1	0	0	1	1	0

b) Raw scores achieved on significant elements, tetrads 9 to 16, in The University of Scranton Student Description Sheet, by 342 Freshmen (1958-1959) of the University of Scranton. (Cont'd.)

Student	Elements																	
	9a	9b	10a	10d	11a	11c	12a	12d	13b	13d	14b	14c	15a	15c	16c	16d	T
367	-1	0	-1	0	0	0	-1	0	0	1	1	0	0	0	-1	-1	- 4
368	-1	0	0	-1	0	0	0	1	0	-1	-1	0	0	1	0	-1	- 3
369	1	0	1	1	0	0	-1	0	0	-1	0	-1	0	1	0	0	3
370	0	1	0	1	1	0	1	1	0	0	1	0	0	1	1	0	16
371	0	0	-1	-1	-1	0	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-19
372	-1	0	0	1	1	1	0	1	1	0	1	1	0	1	0	0	14
373	1	0	1	1	0	1	1	1	0	1	1	1	1	1	1	0	15
374	1	1	1	1	1	1	0	0	1	1	1	1	0	1	1	0	19
375	0	0	1	0	0	1	1	1	0	0	0	0	0	1	0	-1	7
376	1	0	0	1	0	1	0	1	0	1	1	1	1	1	1	0	17
377	1	1	0	1	1	1	0	1	0	1	0	1	1	0	1	1	18
378	0	-1	1	1	1	1	0	1	0	0	0	-1	0	1	1	0	5
379	-1	-1	0	0	-1	-1	-1	0	0	0	-1	-1	0	0	-1	-1	-15
380	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	26
381	0	1	1	1	0	1	0	1	1	0	0	0	1	1	1	0	19
382	-1	0	0	1	-1	0	0	-1	0	1	0	-1	0	0	0	1	1
383	0	-1	1	1	-1	0	0	1	-1	-1	0	-1	0	1	0	-1	0
384	1	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	6
385	1	1	1	0	1	0	0	0	1	0	1	1	1	1	1	0	14
386	1	0	1	1	0	0	0	1	0	0	1	1	1	1	1	0	16
387	1	1	1	0	1	0	0	1	0	0	1	1	1	1	1	0	17
388	0	0	1	1	1	1	0	1	0	0	0	1	0	1	0	0	13
389	1	0	1	1	1	0	0	1	0	0	1	0	1	1	1	0	20
390	0	-1	1	0	-1	0	-1	0	0	-1	-1	0	0	-1	-1	-1	- 5
391	0	0	1	1	1	1	0	1	1	1	1	0	1	1	1	1	17

e) Raw scores achieved by 342 University of Scranton freshmen (1958-1959) on the Iowa High School Content Examination (IHSCE) and the Ohio State University Psychological Test (OSUPT) also, high school rank (HSR) and quality point index (QPI) for the fall semester, 1958. (Cont'd.)

Student	OSUPT Part 1	2	3	Total	IHSCE Part 1	2	3	4	Total	HSR	QPI
367	10	24	23	57	40	45	32	59	176	4	2.50
368	12	27	20	59	54	21	22	55	152	2	1.18
369	9	24	32	55	34	22	20	41	117	3	1.60
370	8	22	28	58	44	26	33	42	145	2	.47
371	14	12	29	55	56	33	40	74	203	2	1.66
372	21	33	36	90	53	31	44	51	179	5	2.00
373	14	39	31	84	57	40	49	61	207	5	1.00
374	24	41	50	115	57	51	62	74	244	3	1.52
375	4	14	19	39	50	17	34	44	145	1	.38
376	25	31	36	92	62	15	36	57	170	1	.90
377	23	47	44	114	71	40	52	72	235	4	2.16
378	24	34	36	94	54	34	48	61	197	4	1.61
379	8	19	23	50	40	31	28	44	193	2	1.55
380	13	35	37	85	62	41	58	61	222	4	1.17
381	10	21	34	65	35	16	30	36	117	4	.57
382	16	34	40	90	60	44	42	67	213	5	1.42
383	15	20	27	62	52	35	44	73	204	1	.26
384	16	22	36	74	33	29	41	42	145	3	.35
385	12	36	26	74	56	36	34	55	181	5	1.00
386	21	36	44	101	70	47	38	71	226	4	1.73
387	11	13	19	43	36	31	46	42	155	2	.31
388	12	19	16	47	37	25	20	48	130	4	2.27
389	17	31	35	83	57	34	37	56	184	1	.00
390	17	30	33	80	50	29	49	47	175	3	1.24
391	25	46	33	104	62	35	39	89	225	4	2.43

APPENDIX 6

CORRELATION MATRIX OF FORTY-FOUR VARIABLES

APPENDIX 6

Correlation Matrix of forty-four variables obtained from scores of 342 freshmen (1958-1959) at the University of Scranton. (Decimal point omitted.)

Variables	1	2	3	4	5	6	7	8	9	10
1		4536	0559	2559	4185	2281	0516	2672	4108	1508
2	4536		1884	2317	4445	4060	-0356	3844	4530	1175
3	0559	1884		3560	3399	2362	0513	0279	2568	1712
4	2559	2317	3560		2437	2163	0373	0090	2691	2175
5	4185	4445	3399	2437		3951	1106	2696	4332	1140
6	2281	4060	2362	2163	3951		0840	2185	3786	1692
7	0516	-0356	0513	0373	1106	0840		1535	2329	3123
8	2672	3844	0279	0090	2696	2185	1535		3031	0425
9	4108	4530	2568	2691	4332	3786	2329	3031		4173
10	1508	1175	1712	2175	1140	1692	3123	0425	4173	
11	0216	0052	2248	2604	1920	0781	1489	-0882	2031	2234
12	2951	4165	2521	3009	3358	2748	1914	1299	4477	2372
13	2460	3203	2667	2604	4059	2246	1314	1934	4611	2532
14	2640	3305	2532	1671	3591	3949	2755	2528	4633	2379
15	3779	5313	3442	2836	5175	4188	0515	3292	5147	2198
16	3099	4078	2395	1743	3320	4078	1048	3312	4453	1611
17	3461	4580	2156	1916	4583	4126	1204	2765	4718	1600
18	2035	2107	2991	3374	3042	3023	2091	0180	3220	2391
19	3089	4592	2012	2200	3031	2200	-0210	3109	3841	1274
20	2599	1984	1601	0476	2791	2068	2012	2031	4084	2294
21	2791	4411	2898	2717	4264	3845	1795	1406	5136	2836
22	2691	4481	2674	2544	3736	3858	1037	2592	4032	2031
23	2479	3555	2339	2306	3472	2437	1038	1664	4079	1600
24	3407	6425	2226	2642	4753	4607	0337	3752	4989	1210
25	2486	4306	2966	2420	4028	4502	1539	2088	4507	2614
26	1756	0794	2692	1812	2702	2279	4259	0425	4420	4136
27	3263	4083	2768	1621	4303	3562	1748	3009	5095	2226
28	3224	3860	2913	2620	4244	3049	1232	1924	4795	2559
29	3905	5180	3220	2624	5382	4739	1822	2882	5060	2616
30	3351	5565	3060	2655	5074	4306	-2115	2774	4644	1261
31	3999	5103	3640	2895	4951	4308	1178	2567	5315	2775
32	1030	2207	2189	1879	2852	1816	2799	1132	3411	3817
33	4864	6248	4459	4155	6534	5530	2656	3846	7392	3937
34	1263	0341	1004	0250	1035	1511	1956	0962	2495	2345
35	2023	1146	1569	1379	1430	1692	2904	1633	3349	2782
36	1702	0714	1108	0515	1175	1736	2593	1749	3235	2554
37	2065	1061	1376	0906	1440	1976	2722	1851	3579	2878

Correlation Matrix. (Cont'd.)

Variables	1	2	3	4	5	6	7	8	9	10
38	1642	0800	1069	0706	0685	1251	2421	1555	3138	1964
39	1603	1304	1192	1220	1218	1775	2634	1681	2991	3199
40	1948	1394	0830	0474	1458	1995	2075	1311	3326	2595
41	2210	1195	0758	0526	1440	1951	2220	2252	3358	2015
42	2186	1346	1090	0892	1329	2045	2768	2030	3768	2811
43	2902	3211	2773	2601	3180	3238	2150	1220	4322	3362
44	1551	1031	0625	0993	2135	2393	1687	1150	3247	1747

Correlation Matrix. (Cont'd.)

Variables	11	12	13	14	15	16	17	18	19	20
1	0216	2951	2460	2640	3779	3099	3461	2035	3089	2599
2	3052	4102	3203	3300	5313	4078	4[illegible]	2107	4592	1984
3	2248	2521	2667	2532	3442	2395	2156	2991	2012	1601
4	2804	3009	2604	1671	2636	1743	1916	3374	2200	0476
5	1920	3358	4059	3591	5175	3320	4583	3042	3831	2791
6	0781	2748	2246	3949	4188	4078	4126	3023	2200	2068
7	1489	1914	1314	2755	0515	1048	1204	2011	-0210	2012
8	-0882	1299	1934	2588	3292	3312	2765	0180	3109	2031
9	2031	4477	4611	4633	5147	4453	4718	3220	3841	4004
10	2234	2372	2532	2379	2198	1611	1698	2391	1274	2294
11		2315	2778	2410	1303	1115	1809	2791	1135	1263
12	2315		3321	2954	3674	2819	3889	3085	3496	2202
13	2778	3321		4936	4726	2670	3383	2794	2820	2731
14	2418	2954	4936		4508	4036	3728	3120	2800	3160
15	1383	3674	4726	4508		5757	5447	3463	4571	2529
16	1115	2819	2670	4036	5757		4063	2963	3386	2222
17	1809	3889	3383	3728	5447	4063		3884	5062	3141
18	2791	3085	2794	3120	3463	2963	3884		2115	2137
19	1135	3496	2820	2800	4571	3386	5062	2115		3186
20	1263	2202	2731	3160	2529	2222	3141	2137	3186	
21	2150	3998	3557	3816	4938	3227	4690	3722	3435	3262
22	2317	3054	3817	3025	4091	3305	4122	3602	3293	1952
23	1664	3242	4304	2432	4475	3217	3998	2775	2941	1197
24	1461	4251	3908	3603	6036	4759	5431	3090	4805	2369
25	3343	4074	4158	3004	5089	3810	4633	3976	3578	2741
26	2839	3120	2987	3693	2707	2615	2513	3193	1076	3604
27	2522	2790	3545	4307	4717	4024	4194	3461	2695	3049
28	2320	4171	3950	3240	4529	3475	3866	4031	2892	1860
29	2502	3666	3759	4448	6265	4082	5169	4107	4220	3428
30	2055	3417	3948	3382	5944	4239	4861	3355	4647	2791
31	1770	3870	4066	4077	6344	4804	5796	3901	4070	3945
32	1937	3172	2723	2587	2985	1605	2464	2862	2008	2468
33	3396	5630	5831	5090	7424	5913	6708	5381	5512	4483
34	0375	1508	1708	2097	1471	1950	0986	1728	0305	2421
35	0739	2041	2476	2735	0426	0578	0100	1948	-4796	0651
36	0479	1852	2057	3201	1353	2424	1375	2072	0942	2937
37	0682	2151	2460	3675	1837	2715	1582	2296	1141	3161
38	0463	1520	1880	2953	1816	2504	1704	1660	0527	2529
39	-0162	0906	1898	2824	1088	2417	1777	1625	0441	2277
40	0261	1956	1878	2823	2108	2745	2094	1437	0742	2540
41	0128	1309	1516	3028	2139	2604	2124	1205	0879	2021
42	0181	1649	2146	3399	2348	3099	2215	1689	0668	2683
43	2363	3225	3364	4266	3699	3027	3532	3465	2332	2900
44	1112	2046	1215	2650	1674	2117	1797	2095	0915	1926

Correlation Matrix. (Cont'd.)

Variables	21	22	23	24	25	26	27	28	29	30
1	2791	2691	2470	3407	2486	1756	3263	3224	3905	3351
2	4411	4481	3555	6425	4306	0794	4083	3860	5180	5565
3	2898	2674	2339	2226	2966	2692	2768	2913	3220	3060
4	2717	2544	2386	2642	2429	1812	1621	2620	2624	2655
5	4264	3736	3472	4753	4028	2762	4303	4244	5382	5074
6	3845	3858	2437	4607	4502	2279	3562	3049	4739	4308
7	1795	1037	1038	0337	1539	4259	1748	1232	1822	-0115
8	1406	2592	1664	3752	2088	0425	3009	1924	2882	2774
9	5136	4032	4079	4989	4587	4420	5095	4795	5560	4644
10	2836	2031	1600	1210	2614	4136	2226	2559	2616	1261
11	2150	2317	1664	1461	3343	2839	2522	2320	2502	2055
12	3898	3054	3242	4251	4074	3120	2790	4171	3666	3417
13	3557	3817	4304	3908	4158	2987	3545	3950	3789	3948
14	3816	3025	2432	3693	3904	3693	4307	3240	4448	3382
15	4938	4801	4475	6036	5089	2707	4717	4529	6265	5944
16	3227	3805	3217	4759	3810	2615	4024	3475	4082	4238
17	4690	4122	3298	5431	4633	2513	4194	3866	5169	4861
18	3722	3602	2775	3090	3976	3193	3461	4031	4107	3355
19	3435	3293	2941	4805	3578	1076	2695	2892	4220	4647
20	3262	1952	1197	2369	2741	3604	3049	1860	3428	2791
21		4598	2893	4806	4462	3866	5174	4611	5520	4731
22	4598		4379	5413	5193	2615	4310	4578	4912	5444
23	2893	4379		4836	4220	2129	3552	4803	3829	4705
24	4806	5413	4836		5301	2295	4767	4629	5897	6755
25	4462	5193	4220	5301		4122	4502	4267	5585	5576
26	3866	2615	2129	2295	4122		3853	3300	3614	2093
27	5174	4310	3552	4767	4502	3853		5503	5364	4976
28	4611	4578	4803	4629	4267	3300	5503		4615	4470
29	5520	4912	3829	5897	5585	3614	5364	4615		6273
30	4731	5444	4705	6755	5576	2093	4976	4470	6273	
31	5115	4678	3948	5795	5412	3734	5348	4845	6335	6064
32	3138	2427	1988	1888	3113	4446	2569	2196	3253	2253
33	6691	6502	5509	7322	7026	5273	6618	6537	7604	7019
34	1602	0641	0108	0550	1369	3364	1853	1657	1624	0681
35	2351	1458	0869	1498	1910	3387	2821	2854	2272	1131
36	1961	0582	0978	1218	1384	3480	2441	2019	1699	0886
37	2406	1254	1063	1494	1944	3843	2947	2759	2263	1204
38	2146	1190	0335	1198	1359	3544	2385	1655	2045	1006
39	2661	1154	0599	1179	1111	3649	1933	1770	2164	0535
40	2187	1584	0404	1723	2223	4008	2216	1603	2480	1396
41	2322	1600	0055	1835	1634	3432	2301	1405	2449	1516
42	2687	1584	0360	1752	1885	4350	2585	1860	2698	1327
43	3035	3054	2688	3263	4258	3745	3802	3039	4105	2986
44	2818	1763	0835	1497	1630	3020	2801	2062	2381	1809

Correlation Matrix. (Cont'd.)

Variables	31	32	33	34	35	36	37	38	39	40
1	3999	1830	4884	1263	2023	1782	2065	1042	1603	1948
2	5103	2207	6248	3341	1146	3714	1361	0830	1304	1394
3	3640	2189	4439	1004	1560	1108	1376	1069	1192	0830
4	2895	1879	4155	0250	1379	0915	0906	0706	1220	0474
5	4951	2852	6534	1035	1430	1179	1440	0635	1218	1453
6	4398	1816	5533	1511	1692	1786	1770	1221	1775	1995
7	1170	2799	2656	2956	2394	2590	2722	2421	2634	2075
8	2567	1132	3846	0962	1033	1740	1951	1555	1631	1311
9	5315	3411	7392	2495	3340	3235	3572	3135	2901	3326
10	2775	3817	3937	2345	2732	2554	2775	1954	3190	2095
11	1770	1937	3396	0375	0739	0477	0682	0437	0162	0261
12	3870	3172	5630	1508	2041	1882	2151	1520	0986	1956
13	4066	2723	5831	1788	2476	2057	2460	1836	1698	1078
14	4077	2587	5990	2697	2735	3201	3675	2953	2824	2823
15	6344	2985	7424	1471	0426	1357	1037	1216	1883	2108
16	4084	1605	5913	1958	0578	2424	2715	2534	2417	2745
17	5796	2464	6708	0986	0100	1375	1582	1704	1777	2094
18	3981	2862	5381	1726	1548	2072	2206	1650	1625	1437
19	4070	2008	5512	0305	-4796	0842	1141	0307	0441	0742
20	2045	2468	4483	2421	0651	2937	3161	2329	2277	2540
21	5115	3138	6691	1602	2351	1961	2406	2146	2661	2137
22	4678	2427	6502	0641	1458	0582	1254	1156	1154	1734
23	3948	1988	5500	0108	0869	0970	1063	0855	0599	0404
24	5795	1888	7322	0550	1408	1218	1494	1138	1179	1725
25	5412	3113	7026	1369	1910	1364	1944	1350	1111	2223
26	3734	4446	5273	3364	3317	3490	3943	2544	3649	4008
27	5348	2569	6618	1853	2021	2441	2947	2305	1933	2216
28	4845	2196	6537	1657	2804	2019	2753	1655	1770	1603
29	6335	3253	7604	1624	2272	1699	2253	2045	2164	2480
30	6064	2253	7019	0681	1131	0886	1204	1006	0535	1396
31		4308	7566	1563	2103	1462	2025	2050	1433	2540
32	4308		4722	3101	3295	2755	3338	2545	2105	1816
33	7566	4722		2360	3397	2801	3435	2711	2736	2970
34	1563	3101	2360		7506	6988	8486	6268	4808	4658
35	2103	3295	3397	7506		7134	9188	5677	4979	4080
36	1462	2755	2801	6988	7134		8948	5509	4548	4431
37	2025	3338	3435	8486	9188	8948		6377	5317	4784
38	2050	2545	2711	6268	5677	5509	6377		5382	5659
39	1433	2105	2736	4808	4979	4548	5317	5382		5966
40	2540	1816	2970	4658	4080	4431	4784	5659	5966	
41	2264	2448	3015	5116	4733	4072	5320	7023	5219	6072
42	2562	2601	3341	6202	5749	5097	6465	8466	7783	8069
43	4196	3373	5426	3491	3848	3055	3820	3654	3708	3708
44	1823	2224	3084	3864	4473	3858	4478	2867	3084	2512

Correlation Matrix. (Cont'd.)

Variables	41	42	43	44
1	2210	2186	2902	1551
2	1195	1346	3211	1031
3	0758	1090	2773	0625
4	0526	0892	2601	0993
5	1440	1329	3180	2135
6	1951	2045	3238	2393
7	2223	2768	2150	1687
8	2252	2030	1220	1150
9	3350	3768	4322	3247
10	2015	2811	3362	1747
11	0125	0181	2363	1112
12	1309	1649	3225	2046
13	1516	2146	3364	1215
14	3028	3399	4266	2650
15	2139	2348	3699	1674
16	2684	3099	3027	2117
17	2124	2215	3532	1797
18	1205	1689	3455	2095
19	0879	0668	2332	0915
20	2021	2603	2900	1926
21	2322	2687	3835	2918
22	1600	1584	3054	1763
23	0055	0360	2689	0835
24	1835	1752	3263	1497
25	1634	1885	4258	1630
26	3432	4350	3745	3020
27	2301	2585	3802	2001
28	1405	1860	3039	2062
29	2449	2698	4105	2381
30	1516	1327	2986	1809
31	2564	2562	4196	1823
32	2448	2601	3373	2224
33	3012	3341	5426	3084
34	5115	6202	3491	3864
35	4703	5749	3848	4473
36	4634	5687	3055	3858
37	5320	6465	3820	4478
38	7027	8666	3551	2867
39	5219	7783	3708	3084
40	6072	8069	3708	2512
41		8777	3386	3186
42	8777		4269	3507
43	3386	4269		4729
44	3186	3507	4729	

APPENDIX 7

UNROTATED, CENTROID FACTOR LOADINGS

APPENDIX 7

Unrotated, centroid factor loadings (fixed communalities) for University of Scranton freshmen's college entrance scores. (Decimal point omitted.)

Variables	Factors I	II	III	IV	V	VI	h^2
1	4718	1278	-1863	-0909	-1342	-1064	0009
2	5616	3985	-2434	-1743	-0098	-1258	-0057
3	3962	1488	1919	1386	1070	0951	0076
4	3606	1815	1911	1247	1195	-0827	0098
5	5840	3038	-0253	-0296	-0270	0428	0097
6	5263	1811	-0575	-0704	0995	1531	-0076
7	3079	-2570	1868	1780	-1786	-1185	0206
8	3640	0954	-3318	-2437	-2162	-1198	0212
9	7424	0623	-0066	0227	-1407	-1134	-0023
10	4295	-1693	2105	2545	-0960	-1477	-0095
11	2917	1078	4235	2505	0932	0672	-0025
12	5344	1498	1258	0514	-0944	-1214	-0025
13	5607	1525	1495	0586	-1223	-0890	0173
14	6162	0050	0110	0512	-0903	0979	-0001
15	6860	3605	-1450	0044	-0339	0461	0000
16	5700	1567	-1816	-0578	-0328	0475	0081
17	6134	2916	-1698	1019	-0263	1309	-0016
18	5103	1129	2498	1132	1065	1214	0059
19	4542	3931	-2389	1493	-3340	1729	0156
20	4551	-0484	-0601	1306	-2471	1587	-0005
21	6479	1535	0396	0752	0980	0290	0038
22	5780	3160	0470	-0517	1662	-0866	0069
23	4713	3349	1422	-0904	-0209	-1938	0006
24	6546	4214	-1669	-1617	0533	-0693	-0007
25	6449	2600	1080	0937	0737	0249	0025
26	5814	-2774	2273	2685	-0161	-0056	0064
27	6487	1598	0357	-0980	0796	0530	0040
28	6092	2311	1955	-1314	0492	-1256	0021
29	7253	2651	-0724	0229	0901	1015	-0031
30	6327	4339	-1002	-1226	1533	0705	-0028
31	7116	2704	-0504	0663	0429	0116	0056
32	4903	-1180	1850	1570	-1596	-0087	0113
33	9528	3076	0654	0380	-0492	-0404	-0122
34	4702	-6268	0214	-2167	-0458	1834	-0046
35	5096	-6175	3236	-5058	1900	-2179	-0850
36	5042	-5655	0577	-2897	-1959	1427	-0037
37	5991	-6422	1116	-3800	-1566	1676	-0169

Unrotated, centroid factor loadings. (Cont'd.)

Variables	Factors I	II	III	IV	V	VI	h^2
38	5027	-5798	-2019	0368	1292	-0293	0047
39	4725	-5048	-1658	0586	0657	-1040	-0001
40	4936	-4617	-2911	1343	1323	-0589	0055
41	5087	-5110	-3680	0719	1886	-0768	-0017
42	6022	-6637	-3958	1515	2471	-1309	-0634
43	6266	-1197	0862	0761	0947	0792	0056
44	4209	-2601	0727	-1257	0483	1757	0010

APPENDIX 8

ABSTRACT OF

Factor Analysis of a Forced-Choice Rating Scale

APPENDIX B

ABSTRACT OF

Factor Analysis of a Forced-Choice Rating Scale[1]

The University of Scranton Student Description Sheet, a forced-choice rating scale, was devised by Paul J. Lilly to be used as part of a college entrance battery. Lilly assumed that this scale would measure factors not already measured by other college entrance tests.

To test this assumption, a factor analysis was made of Lilly's scale and the Ohio State University Psychological Test and the Iowa High School Content Examination, tests used as entrance examinations at the University of Scranton.

The sample used was the 1958-1959 freshman class at the University of Scranton (N = 432).

The following steps were followed in the factor analysis:

a) Pearson intercorrelations were obtained for the forty-four variables.

b) Factors were extracted by the centroid method. Communalities were estimated from ten iterative analyses.

c) Factors were rotated according to Kaiser's varimax criterion.

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1 G. Gordon Henderson, S.J., doctoral thesis presented to the School of Psychology and Education of the University of Ottawa, Ontario, 1959, xii-132 p.

The results of the analysis supported Lilly's assumption that his scale measured factors not measured by the other entrance tests. Six factors were found.

The elements of Lilly's scale loaded significantly on factors I, III, V, and VI. With the single exception of one loading on factor V, significant loadings were found for the other tests on these factors.

Factor I seems to be a measure of an attitude of conscientiousness; factor III, practical ability and judgement; factor V, aggressiveness in social relations; and, factor VI, self-reliance.

Very high loadings were found for the achievement battery (Iowa), ranging from .64 to .99 on factor II. Moderately high loadings, .36 to .47, were reported for the psychological test. Only one significant loading was found for one element of Lilly's scale.

Since Lilly's forced-choice scale is measuring factors not measured by the other tests and since his scale is correlated with college success ($r = .31$), it is valid to infer that the inclusion of this scale in a college entrance battery will increase the predictability of the battery.