CLINICAL JUDGMENTS VERSUS PREDICTIONS BY SINGLE TESTS

by

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INTRODUCTION

The matter of the effectiveness of clinical prediction as compared to that of statistical prediction has long been a point of disagreement among psychologists. While many eminent authorities have made emphatic statements as to the superiority of each method, in the minds of most there remains some doubt as to their relative effectiveness. It is not the purpose of this thesis to prove or disprove any theories already advanced on the subject, but rather to limit this further study to ascertaining the effectiveness of both types of predictions as they might be used in relation to selected problems of prediction at Kansas State College, Manhattan, Kansas.

Entering freshmen at Kansas State College are given a battery of tests designed to give a picture of the individual: his general aptitude, achievement in several fields, personality adjustment, and interests. It is then presumed to be possible for the clinician to use this information in toto or in part in aiding the individual to develop his self concept, to develop his capacities to the utmost, and to achieve a more adequate adjustment, thus a more successful college life--if the student desires this help. Proponents of this hypothesis have made many statements justifying it. Burgess and Cottrell (5) say that because statistical methods deal with averages and probabilities that dynamic combinations

of behavior are excluded. Isidor Chein (6) states that "The clinician sees statistics as one tool in his major methodological objective of conceptually or actually manipulating circumstances to arrive at an understanding of the conditions of events." He feels that the clinician is not concerned with only quantitative variables; he wants to know how these variables affect the individual.

There are, however, several areas into which one must inquire before accepting this hypothesis fully. With each individual and therefore with each individual's judgment one must recognize that the personal equation will come into play. No one views any matter in exactly the same light. To what extent will the judgments of several individuals using the same data vary? Will the training and experience of the clinician greatly affect his clinical judgment?

Sarbin (18) states that clinical judgments are made on the basis of 1) deductions from known and tested generalizations, 2) deductions from plausible but untested hypotheses, 3) deductions from false generalizations, and 4) so-called intuitions. Can one depend on judgments made in this manner? Are clinicians accomplishing their purpose or does the clinical judgment err more than those made from statistics with a known margin of error? Sarbin (18) made a study on clinical prediction of academic achievement as compared with predictions made from regression equations. He states: "From this study we can say with some assurance that the prediction of academic

success or failure can be done simpler and with more accuracy by the statistical method."

There are the two schools of thought. It is important to discover which is the more effective method of utilizing the data gathered on each new student entering Kansas State. In pursuing this study the following questions will be considered:

1) Is prediction by a single test as adequate as prediction by clinical judgments?

A) Is prediction of academic success or failure by the American Council on Education Psychological Examination as accurate as prediction by the clinician?

B) Is prediction from the Strong's Vocational Interest Blank as to the suitability of the student's curriculum as accurate as prediction by the individual counselor using a battery of tests?

2) Is the clinical judgment of the experienced counselor any more valid than that of the advanced student?

3) Is the accuracy of the prediction from the clinical judgment increased by adding the individual record form and the autobiography to the battery of tests considered?

MATERIALS AND METHODS OF PROCEDURE

Entering freshmen at Kansas State College are given a battery of tests designed to give information about what sort of person the individual is, how well he is able to learn, what his interests are, and what his level of achievement is in certain areas. This is done through the Counseling Bureau, and scores are available to counselors and faculty advisers for use in whatever manner is most valuable to the student. The battery consists of the American Council on Education Psychological Examination, both the American Council on Education English Test and Reading Comprehension Test, the Minnesota Personality Scale, and the Strong's Vocational Interest Blank. Engineering students take the Revised Minnesota Paper Form Board and the Cooperative Mathematics Test. In addition, each freshman fills out an Individual Record Form and writes a short autobiographical sketch. Since the scores on these tests of freshmen entering Kansas State in the fall of 1948 are vital to this study, a brief description of each test follows.

The avowed purpose of the American Council on Education Psychological Examination (15) is to appraise what has been called scholastic aptitude or learning ability, with specific reference to the requirements of most college curricula. Three scores are given. The "Q" or quantitative test score

is the sum of the number of answers the individual has correct on the sub-tests: arithmetical reasoning, number series, and figure analogies. The quantitative group is designed to measure abilities necessary in technical vocations such as engineering. The "L" or linguistic test score includes the same-opposite test, the completion test, and verbal analogies test. The linguistic scores are designed to measure those abilities which are necessary in work involving the manipulation of verbal material. The third score is the total of the "Q" and "L" scores. These scores are converted into percentile ranks to compare the student with his classmates. Any wide discrepancy between the "Q" and "L" scores is thought by some to be indicative of an emotional disturbance.

The Cooperative Achievement Test (8) for English consists of three parts: English usage, spelling, and vocabulary. This test is useful for selection of individuals with the highest scores, placements in groups on the basis of their standing, or for aid in individual guidance. The same features are true for the Cooperative Reading Comprehension Test; reading speed and level of comprehension are measured.

The Minnesota Personality Scale (11) yields scores on areas of personal adjustment designated as morale, social adjustment, family adjustment, emotional adjustment and economic conservatism. The first four are considered to be the most useful. A low score on the morale scale indicates the student is not very happy in his outlook for the future. It might be

an evidence of depression. A high score indicates optimism. Social adjustment relates to social sure-footedness. Low scores indicate a lack of self-confidence in social situations. High scores indicate ease and poise in social situations. The family adjustment key is probably the most important scale on the test. Poor family adjustment is indicated by low percentile rank, and is usually a handicap to an individual. Poor home adjustment is usually accompanied by other problems of a psychological nature. Low scores on the emotionality key indicate an unstable personality. Average to high scores indicate a stable personality. Extremely low scores on these tests are symptomatic of maladjustment, and counseling is usually indicated.

The Strong's Vocational Interest Blank (11) is exactly what the name implies, and is not one of intelligence, school achievement, or special aptitude. It measures the extent to which one's interests agree or disagree with those of successful men in given occupations, and it is possible with a fair degree of accuracy to predict by this test whether or not one would be satisfied in certain occupations. The test is most useful if a score is computed for each of the individual occupations on which the test was standardized. However, complete scoring is a very difficult and time-consuming process, and unless it is especially requested the tests are scored only for groups of occupations determined by factor analysis. The following list shows the occupational groups

which are scored: Artistic-Medical, Engineer, Agricultural-Technical, Social Service, Business Detail, Sales, and Writers and Lawyers. The occupations included in the respective groups all correlate highly with one another. Students have been given letter ratings on each of seven group scales. Occupations in groups rated A and B-plus should be carefully considered before definitely deciding against them; occupations in groups rated C, C-plus, and B-minus should be carefully considered before definitely deciding to enter them. There are also three non-occupational keys which give a better understanding of a student's interest pattern. The OL scale refers to "occupational level" and gives scores on a continuum, indicating whether one's interests are similar to unskilled workmen (a low score) or to business and professional men (a high score). The MF or masculinity-femininity scale indicates whether one's interests are similar to the interests of women or men, and in general reflects how verbal one's interests are. The IM scale expresses maturity of interests. This score differentiates between interests characteristic of children and young people and those of adults. A low score is an indication of interest immaturity, and may reflect inability to take responsibility, restlessness, immature attitudes, and enjoyment of activity. One's age must be taken into consideration in interpreting the IM score, and is generally not used if a student is over 25 years of age. Many advisers and counselors feel that the little autobiographical

sketch written as the English placement theme gives a quick insight into the "individual as a whole," and helps in interpreting the rest of the data in the folder. In this sketch, the freshman relates the high spots and low spots in his career, which usually gives some deep insights into the kind of person he is and why he is that sort of person.

The Individual Record Form also gives much information to supplement this. Besides the identifying data, it includes information about his family, his high school experiences, his work experiences, his leisure time preferences, his plans and goals for the future, his health, and his concept of himself and his problems.

A sampling was made taking one out of every five of the freshmen of 1948 who took the battery of tests, making a total of 257 students. Ten of these were eliminated from the sample because of incomplete information.

Four counselors and four advanced students utilized this battery of tests in making predictions. They were selected for their varying educational qualifications and experience in the hope that more might be learned as to what influence, if any, training and experience have on the validity of judgments. Since the counselors and students used as judges are important variables, a brief sketch of the training and experience of each will be given.

Counselor Number One is 33 years of age, has completed 96 hours of psychology and education, 73 of them being graduate

credit. He has also completed the course and resident requirements for the Ph. D. degree. His practical experience includes seven years of high school and junior college teaching, counseling, and administration; one year of psychological work in the army; and four years counseling in a college counseling situation.

Counselor Number Two is 29 years of age, is a candidate for the M. S. degree, and has completed 57 hours of education and psychology. He worked nearly two years in the veterans' service department of the State Board of Social Welfare, and has worked in a college counseling bureau for two and a half years. He has tended to specialize in vocational and educational advisement during this time.

Counselor Number Three is 27 years old and has completed course and residence requirements for his doctorate. He has 92 hours in the field of psychology and education. His work experience includes two years of college teaching, mainly dealing with group work; one semester in Personnel, one year teaching psychology, and one year in a college counseling situation.

Counselor Number Four is 24 years of age, has 50 hours of psychology and education. She worked in a child guidance clinic for one year, was practicum supervisor of graduate students for two years, and has been clinical counselor in a college counseling situation for one year. Her training and experience have emphasized clinical procedures, projective

techniques, etc.

None of the advanced students has received any practical experience. Student Number One is 21 years of age, will receive her B. S. degree in the spring of 1950, and has 32 hours of undergraduate credit in the fields of education and psychology. Student Number Two is 24 years of age. He is a candidate for the degree Master of Science and has completed 48 hours of education and psychology. Student Number Three is 23 years of age, has 49 hours of education and psychology and is a candidate for his B. S. degree. Student Number Four is 21 years of age, will receive her B. S. degree in the spring of 1950 and at present is completing these requirements as well as doing graduate work. She has completed 48 hours of education and psychology.

These eight counselors and students made predictions on each of the 247 students in the sample. Clinical judgments were given as to the most probable grade and the next two most probable grades for the freshman year, whether or not the student would survive the freshman year, and whether or not the student would change his curriculum during that time. For half of the students, the above mentioned battery of tests was the basis for prediction. For the remaining half the Individual Record Form and the autobiographical sketch were eliminated from the available data. This was done with the purpose in mind of ascertaining the effect that the inclusion of these two will have on the validity of the judgments.

The criteria for ascertaining the accuracy of the judgments of the counselors and students and the statistical predictions are all information obtained from the Registrar's Office at Kansas State College. They include the grade point average of the student for the freshman year, any changes of curriculum which may have occurred, and the list of students who withdrew or were dismissed during the school year of 1948-49 or did not return to Kansas State for the fall semester of 1949.

As the data were received they were coded and recorded on McBee Keysort cards. There is an individual card for each student containing the following information: name, sex, actual grade point average, grade point averages predicted by the eight counselors and advanced students, use of personal documents, American Council on Education Psychological Examination score, actual change of curricula, whether the student survived, prediction by the counselors and students as to the change, prediction by the counselors and students as to survival, whether or not the student was on probation during the school year, and whether or not he returned in the fall of 1949. These cards were used to facilitate the more rapid and accurate handling of the statistical data.

Product moment coefficients of correlation were then computed between actual grade point average and (1) standing on the American Council on Education Psychological Examination and (2) the predictions of each of the counselors and each of

the students. Predictions were ordered as follows: A-B-C (A is the most probable grade, B is the next most likely, and C is next most likely), B-A-C, B-C-A, B-C-D, C-B-A, C-B-D, C-D-B, C-D-F, D-C-B, D-C-F, D-F-C, and F-D-C.

In addition to computing these coefficients for the total group, correlations were made on the following subdivisions: women for whom no personal documents had been used in making the predictions, women for whom personal documents were used, men for whom the documents were not used, and men for whom they were used. These were done for all predictions made by the counselors and students.

Percentages of agreement of prediction as to curriculum changes were computed for each counselor and student, as well as for the Strong's Vocational Interest Blank. These were also computed according to sex and the use of personal documents. It was assumed that those ranking lower than a B-minus on the Strong's Vocational Interest Blank would not remain in the curriculum in which they were enrolled. The difference and critical ratio were computed for predictions as to curriculum changes with and without the use of personal documents, for the percentages of agreement between the predictions of the counselors and students, and for the percentages of agreement of the statistical predictions and clinical judgments.

Percentages of agreement of prediction as to whether or not the student would survive the freshman year were also computed for each counselor and student. Two cutting points

were used to determine which students would be expected to fail or drop out according to the American Council on Education Psychological Examination. Percentages were computed using agreement of the group which ranked in the lowest 10 percent and those who ranked in the lowest 20 percent. These were divided into separate groups of men with and without personal documents and women with and without the documents. The difference and critical ratio were computed for predictions as to survival, with and without personal documents; for men and women; for the percentages of agreement between the predictions of the counselors and students; and for percentages of agreement between the statistical predictions and the clinical judgment. Where the level of confidence appeared to be significant, it was included.

A REVIEW OF RELATED LITERATURE

While there have been no studies which investigate precisely the same problems undertaken here, the need has been so greatly felt that a number of similar studies have been made by researchers in the field at colleges and universities throughout the country.

One such study was done by F. G. Livingood (14). His hypothesis was that "a battery of standardized tests administered to freshmen with a derived aptitude index can serve effectively to indicate probable scholastic achievement in col-

lege, particularly during the first two years in the college program." Two hundred and ninety-nine freshmen from the Liberal Arts College were given a battery of tests including two psychological tests, one reading test, one mathematics, one English, one language aptitude, one social studies, and one science test. An aptitude index was worked out from the last five of these. The scholastic index was the student's achievement during the first year of college. Correlation coefficients were then computed with the following results: aptitude index with the freshman cumulative index, .67; the freshman cumulative index with the secondary-school index, .63; the freshman cumulative index with the average of the two psychological examinations, .37. The conclusion reached was that 50 percent of the freshman scholarship indexes can be predicted within plus or minus .5 of an index point. The correlation seems to be best for the freshman year, and less in the junior and senior years.

David F. Votaw (23) made use of three tests: the American Council on Education Psychological Examination, The Cooperative English Achievement Test, and the Use of Library and Study Materials Test. Scores on these tests were converted into T scores and substituted into a formula from which an estimate could be made of the student's expected scholastic grade point average. The probable error of such an estimate was found to be .42. The correlation of the actual grade point average with the weighted combined scores of the three tests

was found to be a plus .61, this being higher than the correlation of any one of the three tests with grade point averages.

The American Council on Education Psychological Examination alone was used by W. L. Wallace as a basis for research (23). Freshmen who enrolled in the fall of 1947 at the University of Michigan were given the ACE Psychological Examination. The majority of them were from the Colleges of Literature, Science, and the Arts with a few from Pharmacy, Music, and Architecture. No engineers were included in the study. Actual grades in the 18 largest and most usual courses of the first semester were compared with the test scores of students taking them. Simple correlations were computed between the course grades and each of the three scores on the 1947 Form of the ACE. In addition, multiple correlations were calculated between grades and the combination of the Q and L part scores. Several conclusions were reached. Seemingly, correlations were small between the scores on the ACE and grades in courses. The greatest relationship was established between the English grades and the total score on the ACE. The correlation coefficient here was .49, leaving much to be desired since only 24 percent of the variation in grades in that course was accounted for in the ACE scores. Correlations with other courses were even less. Correlations seemed to be highest with the first semester grades, decreasing with succeeding levels. Due to the smallness of the relationship between the results of this test and achievement as measured by the first year college

grades, one may assume that an individual obtaining a low score on the ACE may profitably engage in college work if other indications are in his favor. Since there is also such a slight differential in the early predictive value between the Q and L scores, considerable caution should be used in the interpretation of the Q and L differential for purposes of educational guidance. However, he concludes that the American Council on Education Psychological Examination remains one of the best single predictors of academic success in higher education.

Theodore A. Sarbin (17) set out to disprove the hypothesis that "By virtue of the case study method employed, clinical counselors' predictions will be more accurate than those determined from regression equations." The research was done at the University of Minnesota, and predictions were made on 162 freshmen, 73 men and 89 women who enrolled in the arts college in 1939. The data available to the counselors were the measurement variables, additional tests of aptitude, achievement, vocational interest and personality, the individual record form, preliminary interviewer's form, and impressions from the counselor's own observations. The predictions were made by five clinical counselors on the eight point scale and correlated with actual honor point ratios at the end of the quarter. The statistical prediction was made by substituting the values of two variables, high school rank and college aptitude test score, in a previously derived regression

equation and solving for the most probable honor point ratio. The coefficient of correlation between the actual honor point ratios and clinical and statistical predictions were as follows:

Type of prediction	Men	Women
Clinical	.35	.69
Statistical	.45	.70

The following conclusions were reached by Dr. Sarbin (17):

1.) Statistical predictions are more accurate than clinical predictions if the same trend continues.

2.) Factors such as interest, inferred level of aspiration, and personality traits, as measured in this experiment, appear not to be related to achievement in college. Furthermore, clinical interviewers do not use these measures systematically, so that actually they give little or no weight to them in making predictions.

3.) In formulating predictions, counselors seem to rely for the most part on rank in high school graduating class and college aptitude test results. These are the same variables which are found in the regression equations.

4.) This leads us to the conclusion that as a complement to actuarial predictions, the clinical predictions add nothing.

5.) When cast in the form of success-failure instead of the eight interval scale, clinical predictions are shown to be no more valid than the more easily obtained statistical predictions.

6.) The reliability of clinical predictions by the interviewers and case readers varies from .64 to .88. The predictions made by the same case reader six months apart correlated to .78.

7.) Clinical predictions overestimate the criterion by about one-third of a letter grade. Statistical predictions overestimate by no significant amount.

Sarbin sums up his study as follows:

> Any jury sitting in judgment on the case of the clinical versus the actuarial methods must on the basis of efficiency and economy declare overwhelmingly in favor of the statistical method for predicting academic achievement. Even though the small differences which uniformly favor the actuarial method are not statistically reliable, the factor of time and efficiency will decide in favor of the regression equation with its known margin of error.

A study which may be briefly reviewed is that of Kenneth H. Freeman at Christian College (12). Over a four year period the actual marks of 1000 first year students were compared with the most probable grade point average as obtained from a regression equation utilizing scores from the Otis Self-Administering Tests of Mental Ability and the Iowa Placement Test in English Training. Sixty-nine and one-tenth percent of the cases had a standard error of zero to one standard deviation. From this he concluded that for those who believe that academic success is a prerequisite to a happy and successful college experience, this procedure may provide a solution. It has been used successfully to identify those students whose lack of academic proficiency points to the probability of an unprofitable experience in a specific college or university.

At the University of Chicago, A. L. Assum and S. J. Levy made a study of ability and achievement of both presumably adjusted and maladjusted students using 71 of each group (3). These data included five ratings of scholastic aptitude which are given to entering students: the ACE Q score, the ACE L

score, the ACE T score, the College Reading Ability Score, and the College Writing Ability Score. Additional criteria were grades and the college comprehensive examination scores. The results were that the maladjusted group compares in academic ability to the adjusted group, but that there is a difference in favor of the adjusted group in regard to academic achievement.

A comprehensive study entitled Predicting Success in Professional Schools has been made by Dewey B. Stuit, Gwendolen S. Dickson, Thomas F. Jordan, and Lester Schloerb, members of a subcommittee of the Committee on Student Personnel Work of the American Council on Education (21). This group has combined into one book the bases for predicting success in engineering training, law training, training for medicine, training for dentistry, the study of music, agricultural training, teacher training, and in nursing schools. While it is impossible to go into the details of each of these bases, some of the basic assumptions may be listed. Speaking of the prediction problem in general, they feel that "perfect efficiency is not possible, but it is feasible to speak concerning an individual's chances of reaching a specified level of achievement or adjustment. In general, one can say that the chances of success are good for a high-ranking student and poor for the low-ranking student." Two prediction factors are taken into consideration: the personal factor, which includes all of the traits or characteristics that pertain to a

person, the result of primarily native or environmental factors; and situational factors, including all those influences which are independent of the individual and external to him. It is stated that one often fails to take into account the situational factors. The predictive indexes include personal history data, previous educational records, scholastic aptitude tests, scholastic achievement tests, special aptitude tests, personality and interest factors, and a combination of predictive factors. In these studies, the predictive value of combinations of measures is almost always described in terms of the multiple correlation coefficient since the predictive value of clinical judgments, as used in counseling, has simply not been reported extensively in literature.

A very brief study is reported by Lee J. Cronbach in his Essentials of Psychological Testing (7). Men in the Navy who were sent to electricians' mate school were given two tests--Electrical Knowledge and Arithmetical Reasoning. These two tests correlated to .50 with success in training. Trained enlisted classification specialists interviewed each man, having available his test scores, a life history, and other data. Based on test scores and judgments, the interviewers' rating correlated only .41 with success. In other words, judgments departing from the test recommendation reduced the correctness of prediction. This finding was confirmed in Air Force research. The conclusions were that personnel workers must be extremely competent, and that there seem to be better predic-

tions by the multiple correlation method.

In a bibliography, Earle E. Emme lists the following conclusions reached by authorities in the field (10):

(Wagner) Prediction based on high school performance as measured by the average on the New York State Regents' Examination is the best single criterion at the University of Buffalo.

(Paul) Students with high scores on the placement tests tend to remain in school longer, earn more hours of credit, and fail in fewer courses.

(Hildreth) If a student is high originally he tends to remain high, but if he is low, prediction of his ultimate status is less certain.

(Williamson and Darley) Tests will only predict perfectly if and when the necessary conditions are present in the student. It is conceded then that the test has greater significance when combined with other personal factors.

(Russell) Success depends more on certain factors; motivation, physical and mental health, personality and social relations of the student with parents as well as fellow students and faculty, on the degree for which home and school have prepared students for individual living and self-direction, than on marks and tests.

(Leaf) Two regression equations predict the average college marks of the students within .44 and .40 of a letter mark.

Emme concludes that there is much evidence that high school performance or rank is the best single criterion for prediction. Other factors are intelligence, college marks, tests of all kinds, interest and enjoyment, and personality traits and characteristics. The predictive method is considered the best method of all since it embraces several factors.

All of the studies reported on, while exceedingly valuable, are so contradictory that no doubt remains concerning the need for continued research on the most effective methods of prediction.

RESULTS

The product moment coefficients of correlation between the actual grade point average and the predictions as to the most probable grade are given in Table 1.

For the total sample group the correlation coefficient of the American Council on Education Psychological Examination with the actual grade point average is .416. The coefficients for the counselors' predictions vary from .460 to .527 and for the students' predictions from .408 to .473. It can be seen that all of the coefficients of the predictions with the exception of that of one student's are superior to the statistical prediction computed from scores made on the ACE.

Table 1. Correlations of grade point average with predictions.

Measure	Coefficient (Product moment)				Total
	Men		Women		
	NPD	PD	NPD	PD	
ACE	.369		.574		.416
Counselor One	.408	.565	.470	.582	.527
Counselor Two	.449	.500	.302	.551	.510
Counselor Three	.374	(.395)*	.562	(.492)*	.509
Counselor Four	.354	.546	.316	.689	.460
Student One	.330	.439	.301	.475	.408
Student Two	.421	.506	.134	.484	.473
Student Three	.299	.434	.272	.601	.417
Student Four	.340	.489	.337	.520	.432

* Did not use personal documents

Further breakdown of the chart gives additional information as to the most effective method of predicting grade point averages. Wide variations occur between the correlation coefficients when the personal documents were used for predicting and when they were not. Smaller individual variations occur depending upon the sex of the individuals whose grades are being predicted. For the counselors these were between .354 and .449 for the men when no personal documents were used. When personal documents were used the variation was from .500 to .565. Variations of the coefficients for the

predictions of women's grades were from .302 to .562 when no personal documents were used, and from .551 to .689 when personal documents were used. Although the correlation coefficients have been figured separately for Counselor Number Three, this counselor did not use personal documents for his predictions.

For the students, the predictions on men with no personal documents ranged from .299 to .421, and for men with personal documents they were .434 to .506. For the women with no personal documents they ranged from .134 to .337 and with personal documents the correlations were from .475 to .601. The group consisting of women with no personal documents was considerably smaller than the other groups with the result that a few incorrect predictions by Student Number Two caused his extremely low coefficient of correlation.

For all counselors and students, predictions made with the use of personal documents had higher coefficients of correlation with the actual grade point averages than did those made without the personal documents. For the most part, the counselors had higher correlation coefficients of predictions than did the students.

When the breakdown was made for men and women on the statistical predictions of the American Council on Education Psychological Examination, the product moment coefficient of correlation for men with the actual grade point average was .369 and for women was .574. This discrepancy between the

predictability of men and women was borne out in other results mentioned throughout this study.

Table 2 shows the percentages of agreement for predicted change of curriculum with the actual change of curriculum. The statistical prediction was based on data from the Strong's Vocational Interest Blank, and the eight counselors and students made their predictions using personal documents on half of the group and without their use for the other half.

Table 2. Percentage of agreement for predicted change of curriculum with actual change of curriculum.

Criterion	Percentage of agreement				
	Men		Women		Total
	NPD	PD	NPD	PD	
Strong's Vocational Interest Blank (B-minus or less)	71.3	68.7	50.0	53.7	66.5
Counselor One	92.1	85.5	95.5	85.4	89.0
Counselor Two	75.2	71.1	90.9	80.5	76.1
Counselor Three	82.4	69.8	83.3	80.8	78.0
Counselor Four	60.0	57.5	80.0	66.7	62.0
Student One	65.3	61.4	72.7	63.4	64.4
Student Two	80.2	83.1	95.5	80.5	82.6
Student Three	85.1	77.1	95.5	75.6	81.8
Student Four	77.2	53.0	68.2	53.7	64.4

Following procedures already described, the percentages computed from the predictions of the Strong's Vocational Interest Blank are: for men in the group with which personal documents were used, 68.7 percent; for men in the group where they were not used, 71.3 percent; for women with personal documents, 53.7 percent; and for women without personal documents, 50.0 percent. This quite marked difference of agreement between the predictions for men and women does not seem to follow through in the predictions made by counselors and students. Those made by the counselors for men with personal documents are from 57.5 percent to 85.5 percent with three of the percentages about 69.8 percent. For men without personal documents they are from 66.7 percent to 85.4 percent with three of the percentages above 80.5 percent. For women without personal documents the percentages varied from 66.7 to 85.4 and with personal documents from 80.0 to 95.5.

In each group of predictions the female counselor's percentages were consistently lower. Students' percentages of agreement were almost consistently lower than those of the counselors with the exception of Student Number Two who is the most advanced in his degree work. The percentages for men with personal documents were from 53.0 to 83.1; for men without the documents from 65.3 to 85.1. For women without personal documents they ranged from 68.2 percent to 95.5 percent and for women with personal documents from 53.7 percent to 80.5 percent. In no case were any of the students able to

exceed the percentage of agreement of Counselor Number One who has both the most experience and training. It should be noted that the use of personal documents does not appear to increase the percentage of agreement for predicted change of curriculum with the actual change of curriculum, but rather to lessen it.

A comparison of the percentage of agreement of the predictions of the counselors with the percentage of agreement of the predictions of the students as to curriculum change is shown in Table 3. Although in each grouping, the percentages of agreement obtained by the counselors exceeded those of the students, there is no marked difference except for women with personal documents. The difference here is 11.2 percent which gives a critical ratio of 1.22, not statistically significant.

Table 3. Comparison of percentage of agreement of predictions of counselors with percentage of agreement of predictions of students as to curriculum change.

Group	Counselors	Students	Difference	Critical ratio
		percent		
Men (NPD)	79.5	77.0	2.5	0.43
Men (PD)	73.5	68.7	4.8	0.68
Women (NPD)	89.4	83.0	6.4	0.62
Women (PD)	80.5	68.3	11.2	1.22

Table 4 compares the percentages of agreement of the counselors and students when personal documents are used and when they are not. A tendency for better accuracy of prediction of curriculum changes when personal documents are not used appears in the case of both the counselors' and students' predictions. This tendency was found to be significant at better than the .10 level of confidence. There was a slightly greater increase in accuracy on the part of the students when personal documents were not used than on the part of the counselors.

Table 4. Comparison of percentage of agreement of predictions of counselors and students for curriculum change using personal documents with percentages of agreement of predictions made without personal documents.

Group	PD	NPD	Difference	Critical ratio
	percent			
Counselors	75.8	84.4	8.6	1.72
Students	68.5	78.0	9.5	1.67

The percentages of agreement for the predicted survival of the freshman year with the actual survival are shown in Table 5.

Standouts as far as high percentages of agreement for all counselors and students as well as both cutoff points on the American Council on Education Psychological Examination are those predictions made for women with no personal documents.

The lowest percentage of agreement in this group was made by a student and was 72.7 percent. Three of the percentages were in the ninth decile, five were in the zero or top decile, and Counselor Number One had 100 percent on this group. Again it should be mentioned that this was the smallest group in the entire sample.

Table 5. Percentage of agreement for the predicted survival of the student through the freshman year with the actual survival.

Criterion	Percentage of agreement				
	Men		Women		Total
	NPD	PD	NPD	PD	
Lowest 10 percent ACE	63.4	63.9	91.0	75.5	68.0
Lowest 20 percent ACE	65.3	62.7	91.0	73.1	68.0
Counselor One	85.1	80.7	100.0	85.4	85.0
Counselor Two	67.3	61.4	86.4	65.9	67.6
Counselor Three	62.7	51.2	91.7	73.1	63.6
Counselor Four	68.0	72.5	90.0	66.7	71.3
Student One	62.4	61.4	81.8	65.9	64.4
Student Two	66.3	62.7	86.4	73.2	68.8
Student Three	63.4	61.4	90.9	73.2	67.6
Student Four	59.4	51.8	72.7	63.4	58.7

Using the students who ranked in the lowest ten percent on the ACE as the group of potential failures or drop-outs, the percentage of agreement for men with personal documents was 63.9 and for men without personal documents was 63.4. For women with personal documents, the percentage was 75.5 and for those for whom personal documents were not used it was 91.0 percent. This again illustrates the apparent fact that it is easier to predict for women than for men. Comparing these percentages with those occurring when the students scoring in the lowest 20 percent are used as the criteria, little difference in percentage of agreement is found. The smallest difference is 0.0 percent and the largest for any of the groups is 2.4 percent.

Counselors' predictions were consistently higher when no personal documents were used, and the students' predictions were in most cases. Counselors' predictions for men with personal documents ranged in agreement with actual survival from 51.2 percent to 80.7 percent; for men with no personal documents from 62.7 percent to 85.1 percent. The percentages of agreement for women were relatively higher for those both with personal documents and without. The counselors' predictions for women with personal documents varied in agreement from 66.7 percent to 85.4 percent; for those without from 86.4 percent to 100 percent.

Students' percentages of agreement were also highest for women with no personal documents. In that category they

ranged from 72.7 percent to 90.9 percent, with three of the percentages being above 81.8 percent. For women without personal documents the percentages of agreement varied from 63.4 percent to 73.2 percent. The predictions for men with personal documents varied from 51.8 percent to 62.7 percent in agreement with actual survival and for the men without personal documents they ranged from 66.3 percent to 68.0.

In comparing the percentage of agreement of the predictions of the counselors with the percentage of agreement of the predictions of the students as to survival throughout the freshman year, those of the counselors were greater for both men and women, with and without personal documents. This is a tendency, but not a significant tendency since the greatest critical ratio, that for men with no personal documents, is significant at only the .15 level of confidence. There is a slightly greater difference between the percentages of predictions of students and counselors for the men and women without personal documents than for those with personal documents. Critical ratios ranged from .52 for women with personal documents to 1.49 for men with no personal documents.

Table 6. Comparison of the percentages of agreement of predictions of counselors with percentage of agreement of predictions of students as to survival of the student through the freshman year.

Group	Counselors	Students	Difference	Critical ratio
		percent		
Men (NPD)	72.6	62.9	9.7	1.49
Men (PD)	67.8	59.3	8.5	1.13
Women (NPD)	22.4	83.0	9.4	0.96
Women (PD)	74.0	68.9	5.1	0.52

When comparisons were made of the percentage of agreement of the predictions of counselors and students as to survival for the group who had personal documents as compared with those who did not, no critical ratios of statistical significance were found. For both counselors and students, however, the percentages of agreement were higher when personal documents were not used, in the case of the counselors the difference being 2.1 percent, and the students 4.0 percent. This might tend to show that in the prediction of survival the students seemed to make more use of the personal documents than did the counselors.

Table 7. Comparison of the percentages of agreement of predictions of counselors and students for survival using personal documents with percentages of agreement of predictions made without personal documents.

Group	PD	NPD	Difference	Critical ratio
	percent			
Counselors	69.9	72.0	2.1	.51
Students	62.5	66.5	4.0	.68

Counselors' and students' percentages of agreement for the prediction of survival were also computed according to percentage of correct predictions for men and percentage of correct predictions for women. It was here that some significant differences were noted. The counselors showed a difference of 9.9 percent more agreement with actual survival for women than for men. This was statistically significant at about the .15 level of confidence. The students showed even more of a difference, amounting to 12.6 percent. This gave a critical ratio of 1.89 which is significant at almost the .05 level of confidence.

Table 8. Comparison of percentages of agreement of counselors and students as to survival throughout the freshman year of men students in the sample with the percentage of women in the sample group.

Group	Men	Women	Difference	Critical ratio
		percent		
Counselors	70.5	80.4	9.9	1.62
Students	61.3	73.8	12.6	1.89

A further discussion of these results is contained in the Interpretation and Summary.

INTERPRETATION

Careful study needs to be made of the product moment correlations of grade point average with predictions as shown in Table 1. Perhaps the most obvious of the conclusions to be drawn is the apparent difference in the predictability of men and women. This is very noticeable in the coefficients of the American Council on Education Psychological Examination for men and women. The coefficient for men is .369, and for women it is .574. This is carried on throughout most of the coefficients of the counselors' and students' predictions, with those for men being higher in only a few instances.

This is true not only in predictions for grade point averages but for other predictions as well. A study of Table

2 indicates that for each counselor and each student the percentages of agreement were higher when predicting curriculum change for women than when predicting for men. This, however, was not true for the percentage of agreement of the Strong's Vocational Interest Blank. Its percentages were substantially higher for men than for women, a point which will be discussed later.

Following through to the predictions for survival shown in Table 5, here again it is found that percentages of agreement are generally higher for women than for men. This is true not only of the counselors' and students' predictions, but also for those of both the lowest 10 percent on the American Council on Education Psychological Examination, and the lowest 20 percent. The percentages for the lowest 10 percent might be noted here again to emphasize this point: men with no personal documents, 63.4 percent; women with no personal documents, 91.0 percent; men with personal documents, 63.9 percent; and women with personal documents, 75.5 percent. In Table 8 the comparison was made for the difference in agreement of the counselors' and students' predictions for the survival of men and women through the freshman year. The percentages were 9.9 percent higher for the counselors' predictions on the women's survival than on the men's, and 12.6 percent higher for the students' predictions on women.

Some reasons might be advanced for the almost consistently higher accuracy when predicting for women. Although women to-

day tend to be breaking away from the old stereotype--the "little woman" who sits quietly at home with no interests but that of her family, no activities but those of a wife and mother, no personality but that which is subdued to those around her--this break is not yet complete in most cases. While women are beginning to achieve independence, there is still the need to conform or to fit into the patterns which others have set up for them. From this, it might be concluded that more women tend to conform than do men, who have probably not, as a group, felt the pressure of similar circumstances toward conformity, and where they were, felt less constrained to follow the accepted pattern. More women tend to perform at the level expected of them, since our culture has trained them to do so.

Since it is commonly known that many women are more mature than are men at the freshman level, it would be expected that their interest maturity would be relatively higher than that of men. However, under the pressure of circumstances toward conformity as a group, it is probable to assume that enthusiasm toward success and achievement in a given field would be lower for women. Thus one would not expect the Strong's Vocational Interest Blank to predict more accurately for women than for men since, as the name implies, it is an inventory of interests of the individual measuring what one would like to do, not what one's family or society as a whole expects him to do. To many freshman men, who for the first

time are spatially free of parental control and domination, the desire to break away from the pressures toward conformity is frequently stronger than the pressures and they may revolt without quite realizing why. They might be more likely to follow their own interests and shift from the pattern set up by their families, thus making them less predictable.

A different, but related, explanation of this phenomenon has been advanced by Paul Torrance who has demonstrated that women evaluate themselves more accurately, that their self-concepts are more realistic.[1] He holds that since what one is able or not able to learn is determined in a large measure by the way one has learned to define himself, and that since women more accurately evaluate themselves, that it necessarily follows that they may be expected to achieve more nearly as predicted.

Another fact to be noted is the increase in the accuracy of grade point predictions when personal documents are used in making the predictions. On examining Table 1, it is apparent that every counselor and every student making predictions had higher correlation coefficients for both men and women when personal documents were used, in most cases these being considerably higher. The question might be raised as to whether the group for whom personal documents were used was not an

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[1] Paul Torrance, Head of the Counseling Bureau, Kansas State College, Manhattan, Kansas. Unpublished research.

easier group to predict. However, this seems not be to the case. Counselor Number Three made his predictions for the entire group using no personal documents. The coefficient of the predictions of grade point averages for men with personal documents was only .021 higher than for the predictions of men without personal documents. For women with personal documents the coefficient was .070 lower than for women without personal documents. This leads one to believe that the use of personal documents does increase the accuracy of predicting grade point averages.

Strangely enough this does not seem to hold true for agreements of predictions for survival and change of curriculum. The percentage of agreement of the counselors' predictions for survival was 2.1 percent lower when personal documents were used and those of the students were 4.0 percent lower. The critical ratios of these percentages, however, were not statistically significant. In the matter of curriculum change, the differences were greater. Counselors' predictions made using personal documents were 8.6 percent lower than those made without using the documents; students' were 9.5 percent lower.

Some reasons have been advanced as to why grade point averages can be predicted more accurately when personal documents are used, but survival and curriculum changes are predicted less accurately when they are used. The autobiography written by the student is in many ways an indicator of past

achievements. From the grammar, English usage, and writing in the theme one can observe whether or not the student tends to conform in his school work. Previous successes or failures in school are often mentioned as well as difficulty with school work. Sometimes the approximate rank of the student in his high school class is designated, and this has been mentioned before (6) as one of the best single criteria of prediction. These factors would all aid in predicting grade point average and survival but would not substantially aid in the prediction of curriculum change.

The clinician reading the personal documents also tends to "identify" himself with the individual whose documents he is reading. At the time of enrollment in college when he writes the documents the student may be carried away by overwhelming fears or enthusiasm about the things to come which later in his first year of college would be considerably toned down. If the clinician becomes too involved in these emotions, it would color his ability to see the individual in his true picture. He might take the information in the documents at its face value, which is not always the true one, particularly for students who are not matured to the adult level.

Training of the clinician seems to exert much influence on the ability of the counselor to make the most of personal documents. This is borne out by the predictions of Counselor Number Four. The use of personal documents increased coeffi-

cients of correlation for men from .354 to .546 and for women from .316 to .689, by far the highest correlation. This counselor's training and experience is almost entirely of a clinical nature, seemingly enabling her to get more out of the personal documents than could those not so skilled in the use of projective techniques. This emphasizes the need for more training of individuals in the use of personal documents. It is probable that few of the counselors or students making predictions have made use of any systematic method of correcting personal biases. In spite of this fact, the use of personal documents seems to be warranted and clinicians need to learn how to use them more advantageously.

Gordon W. Allport (1) states:

> As a self-revealing record of experience and conduct the personal document is usually though not always, produced spontaneously, recorded by the subject himself, and intended only for confidential use. Its themes naturally revolve around the life of the writer, its manner of approach is naturally subjective (phenomenological).....Sometimes they are deceptive and trivial; but sometimes they represent distillations of the most profound and significant experiences of human life. And always they are interesting to the psychologist who must ask even of the deceptive and trivial documents why they were written and, further, why they are dull or deceptive.
>
> Since there are no facts in psychology that are divorced from personal lives, the human document is the most obvious place to find these facts in their raw state.
>
> It is evident that personal documents aid the investigator in maintaining this organismic approach that is nowadays regarded as essential. If nothing else could be said in favor of the personal document, this advantage alone would seem to justify its wider use.

> Our position.....is that if the language of personal documents can be shown to enhance understanding, power of prediction, and power of control, above the level which man can achieve through his own unaided common sense, then these documents must be admitted as a valid scientific method. No loyalty to an operational, to logical, or mathematical creed should prevent it.
>
> It can be shown that these critical tests of science are met by personal documents properly handled.

Returning to the matter of training and experience, it has indeed been shown to be an important factor. In only a few instances were the total predictions of any of the students equal to or more accurate than those of the counselors. Counselor Number One, whose training and experience exceeds that of the other counselors, rated consistently higher in his predictions than did the rest. Student Number Two, who is farthest advanced in his educational training, was more accurate in his predictions than were the other students a large percentage of the time. As was mentioned above, Counselor Number Four was able to make greater use of her clinical sensitivity when personal documents were used than were those who had had less training in that field.

In comparing the effectiveness of the clinical prediction with that of the statistical prediction some factors of varying importance have appeared. As shown in Table 1, the four counselors and three of the students had higher product moment correlation coefficients for the prediction of grade point averages as compared with the actual grade point averages than did the American Council on Education

Psychological Examination. This, however, is somewhat misleading, for when a breakdown was made, in predicting for men with no personal documents, only one counselor and one student were able to exceed the coefficient of the ACE which was .416. For women without personal documents only two counselors and no students were able to exceed the coefficient of the ACE. When personal documents were used, every counselor and student exceeded the coefficient of the American Council on Education Psychological Examination.

This would seem to disprove Sarbin's statement (17) "In formulating predictions, counselors rely for the most part on rank in the high school graduating class and college aptitude test results,.....the same variable used in regression equations". It might also be pointed out that the counselors in Sarbin's study had much more adequate clinical data than did the Kansas State College Counselors, even when the latter used personal documents. The Minnesota counselors had not only personal documents but high school rank, records of interviews, and additional aptitude and personality test results.

It would tend to substantiate Isador Chein's (6) statement as used in the introduction: "The clinician sees statistics as one tool in his major methodological objective of conceptually or actually manipulating circumstances to arrive at an understanding of the conditions of events."

The percentage of agreement for the predicted change of

curriculum with the actual change of curriculum for the Strong's Vocational Interest Blank or the statistical criterion was 66.5 percent. The percentage for the combined group of counselors and students making predictions was 74.8 percent. This gives a difference of 8.3 percent and a critical ratio of 2.02 which is statistically significant at about the .04 level of confidence.

In the statistical prediction of the survival of the student through the freshman year, two criteria were used: those students who had ranked in the lowest 10 percent on the American Council on Education Psychological Examination, and those students who had ranked in the lowest 20 percent. Either group gave the same percentage of agreement for the predicted survival of the student through the freshman year with the actual survival. This percentage, 68.0 percent, as compared with the combined percentages of the counselors and students which was 68.4 percent, showed such a small difference that the critical ratio was not even computed, and certainly there was no statistical significance in the difference. There appears to be no difference in the effectiveness of statistical and clinical predictions for survival made on this particular sample.

SUMMARY AND CONCLUSIONS

It was the purpose of this study to consider the relative effectiveness of two methods of prediction, statistical and clinical. In doing so, the answers to several questions were sought. The first question, "Is prediction by a single test as adequate as predictions by clinical judgments?" was divided into two subdivisions: "Is prediction of academic success or failure by the American Council on Education Psychological Examination as accurate as prediction by the clinician?", and "Is prediction from the Strong's Vocational Interest Blank as to the suitability of the student's curriculum as accurate as prediction by the individual counselor using a battery of tests?".

In answer to the question of the accuracy of the predictions from the American Council on Education Psychological Examination as compared to those of the clinician, the following seems to be true: in predicting grade point averages, the ACE is superior to the clinician when the clinician uses test scores alone upon which to base his judgments. When personal documents were added to the test scores, the clinicians were able to predict more accurately than was the ACE. There appeared to be only a slight difference between the accuracy of the American Council on Education Psychological Examination and the clinician in predicting the survival of the student through the freshman year of college. This did not vary when

the students ranking in the lower 10 percent on the ACE were used nor when the lower 20 percent were used as the criteria.

Concerning the question: "Is prediction from the Strong's Vocational Interest Blank as to the suitability of the student's curriculum as accurate as prediction by the individual counselor using a battery of tests?" the answer appears to be that it is not. The difference in percentage of agreement of 8.3 percent was in favor of the counselors and students. This gave a critical ratio of 2.02 which is significant at about the .04 level of confidence.

The next question was stated as follows: "Is the clinical judgment of the experienced counselor any more valid than that of the advanced student?". From the results of this study, it would appear that training and experience do play a considerable part in the ability of the clinician to predict accurately. Although the data are not statistically significant at a high level of confidence, a definite and consistent trend seems to have been established which would validate this point.

A great deal has been said in answer to the third question, "Is the accuracy of the prediction from the clinical judgment increased by adding the individual record form and the autobiography to the battery of tests considered?". In this study, accuracy of the prediction of grade point averages was increased when these personal documents were added. Percentages of accuracy of prediction of survival remained quite close when personal documents were used and when they

were not, and the percentages of agreement for curriculum change were less when personal documents were used.

The additional factor of greater accuracy in predicting for women was one which had not been expected. It seems to be borne out in both the statistical predictions and the clinical predictions.

While these conclusions may add to the store of knowledge concerning the most effective methods of prediction, it must be remembered that they may be peculiar to our own student population at Kansas State College.

SUGGESTIONS FOR FURTHER RESEARCH

The outstanding characteristic of the literature on the prediction of college grades is the almost universal agreement that correlation coefficients higher than .70 are practically impossible with existing methods (19). In fact, in a group of over a hundred such studies Segel discovered that the median predictive validities of high school scholarship, tests of general achievement or aptitude, and tests of specific aptitudes or achievements were .54, .44, and .37, respectively, (20).

This seems to be due to several factors, most outstanding being the unreliability and the heterogeneity of the most frequently used criterion--the honor point ratio. Another factor is the reliability and validity of the predictive

battery. It is a well-known fact that one cannot create tests which are pure measures of any single factors. Present day thinkers also recognize that spontaneous and uncontrolled factors are always present. These intervening variables cannot be foreseen and will introduce a measure of error in any forecast.

Among such factors to be found in the prediction of academic achievement are momentary motivations such as health conditions, social distractions, sexual distractions, home conflicts, temporary moods, sets, fatigue, and so on. In quoting from Sarbin and Bordin (19) "because of these not readily controllable elements, it would be safe to guess that even with perfectly reliable criteria and with statistically infallible predictive tests, the upper limit of multiple correlation would still not exceed .95." This still leaves us a great margin for improvement over existing median predictive validities. These men suggest that further research may take any one of three courses: further improvement in reliability and validity of predictive battery; improvement in the reliability of the criterion measures; or the design of a new criteria which will be more predictable and at the same time acceptable to school administrators.

In the American Council on Education studies (21) it is again pointed out that in most research the "unknown" is greater than the "known", there is an inadequacy of sampling, and from college to college and within colleges there is a

variability in the quality of the criterion of success used--usually the grade point average. It is felt that there is a need for study of the nonintellectual correlates of success, the establishment of useful cutting scores, and the improvement of the criteria used to measure the performance of professional students. It is imperative that colleges team together to study these problems.

Robert M. W. Travers (22) in his "The Prediction of Achievement" states that there is a need of a new trend in the approach to the study of predictive achievement. There is need of knowledge of the extent to which commonly occurring environmental variations affect the achievement of various outcomes. More information is needed concerning the outcomes that any program of teaching is designed to achieve and valid measures must be developed for each of these outcomes. When one has that knowledge, he feels that the time will be ripe for the preparation of new tests to predict achievement.

With reference to this particular study, future research can well be done. A follow-up might be made using the same sample group and the same criteria as they appear when these students are upper-classmen. New predictions would then need to be made for survival during three or four years, whichever the case might be. The same counselors and students might make a complete new group of predictions for this sample group, testing the ability of the clinician to predict the

same when time has elapsed between the first prediction and the second one. A study might be made on the group of students who failed to react as it was predicted they should, to ascertain why this occurred. Research could be done on the factors which seem to make it easier to predict for women than for men.

Most interesting would be a study in which the predictions would be made on our sample group by counselors and advanced students from another college or university so that the results might be compared. It would also be interesting for these counselors and students to analyze their errors of prediction to learn how to correct for some of their biases, and then make predictions on another population.

It is only by continuing such research studies that the evaluation of methods of predicting can advance.

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