

THE RELATIONSHIP OF VALIDITY COEFFICIENTS TO THE PRACTICAL EFFECTIVENESS OF TESTS IN SELECTION: DISCUSSION AND TABLES

H. C. TAYLOR AND J. T. RUSSELL

Western Electric Company, Inc.

IT has often been pointed out that the magnitude of the correlation coefficient as such is not an adequate representation of the magnitude of the relationship between the two variables which are under consideration. A number of different statistical constants have been proposed by various persons, as giving a more satisfactory representation of the real magnitude of a relationship between two variables. All of these constants are relatively simple functions of the Pearson r .

These include a class of functions of r which bear directly upon an evaluation of the extent to which one variable may be predicted from the other when the correlation coefficient is of a given magnitude. These functions of r include Kelly's alienation coefficient, k , which is $\sqrt{1 - r^2}$, and such functions of k as Hull's measure of efficiency, E , which is $1 - k$, and Odell's g , which is $k/\sqrt{2}$.

All of these ways of evaluating the correlation coefficient have one fundamental characteristic in common, as might be expected from the fact that they are all closely related to the alienation coefficient. That is, that as the size of the correlation coefficient increases the extent to which one variable can be predicted from the other increases more and more rapidly. For example, an r of .50 is usually considered to be only 13% as good as an r of 1.00. It is considered that an r of .87 is only half as good as an r of 1.00.

The wide-spread acceptance of such measures as the correct way of evaluating correlation coefficients has brought about a

considerable pessimism with regard to the validity coefficients which are ordinarily obtainable when tests are tried out in the employment office of a business or industry or in an educational institution. These validity coefficients may range from .20 to .50, although they may occasionally be somewhat higher. It is disconcerting to apply the customary procedures in evaluating these coefficients and discover that the so-called "efficiency" of these tests is only 2% to 13%.

It is the purpose of this paper to point out that under the conditions found when tests are used for selection of employees or students, correlation coefficients within the range of .20 to .50 may represent considerably more than 2% to 13% of the effectiveness of an r of unity.

Chart I illustrates a typical scatter diagram, or normal correlation surface, with test scores represented along the base line and criterion scores along the ordinate. This chart is intended to illustrate the results of a validity check-up of a test in an educational or industrial situation. All persons who are above line SS' (area A + area D) are those who are considered to be satisfactory, while all those below that line (area B + area C) are considered unsatisfactory.

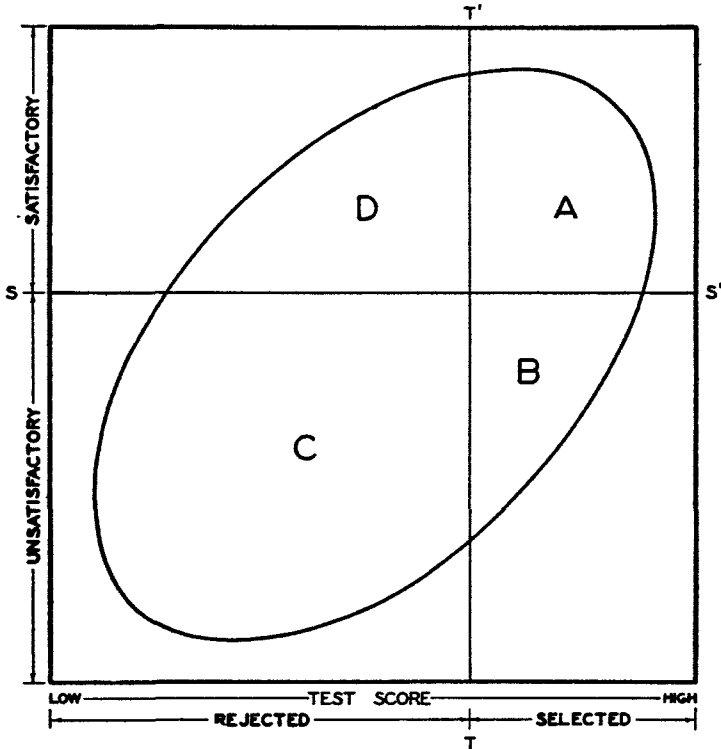
We have divided the persons into those who are below a selected critical test score, represented by line TT' , and those who are above that critical score. The former would obviously be those who would be rejected in terms of their test scores, if the test were used for selective purposes, and the latter those who would be selected if the tests were so used.

The position of line TT' , it will be clear, will vary with the employment situation. Under some conditions it might conceivably be necessary to accept practically every applicant who came to the employment office regardless of his qualifications. In such a situation, of course, a test is of no use, no matter what its validity. In other situations, however, it may be possible to select only the most promising tenth, third, or half of those who apply. Line TT' , then, represents the *selection ratio*.

It will be noted that as soon as one begins to select persons who are above the critical score, represented by the line TT' ,

one begins to assemble a new employee group which distributes like that portion of the present group which is above line TT' , that is, within the area $(A + B)$ on Chart I. The common as-

CHART I



sumption is being made, of course, that the applicant group and the present employee group are similarly constituted. Whereas in the original employee group, before using tests for selection, the proportion of satisfactory employees was represented by

$\frac{A + D}{A + B + C + D}$, there is now being developed an employee group in which the proportion of satisfactory employees will approach

$$\frac{A}{A + B}$$

It will be clear that if line SS' and line TT' are specified, the usefulness of a test may be represented in terms of the ratio, $\frac{A}{A+B}$. Furthermore, with line SS' and line TT' specified, the usefulness of tests with various validity coefficients can be compared in terms of the respective ratios, $\frac{A}{A+B}$, which will be obtained if the tests are used in selection.

Let us now take a typical example. Let us suppose that we consider half of our present employee group to be satisfactory. In other words, area (A + D) is 50% of the total area, and line SS' is thus placed at the mean or median of the criterion distribution. We have, let us say, a test with a validity coefficient of .50 and the employment situation is such that we need to take only the best 30% of those who apply for employment. In other words, line TT' is so set that (A + B) will contain 30% of the total area. Under these circumstances, 74% of those chosen will be successful and only 26% unsuccessful. Now, let us compare that figure with what would be obtained under the same circumstances if the validity coefficient were zero, and if the validity coefficient were unity. If the validity coefficient were zero, we would obviously get the same proportions of unsuccessful and successful employees as if we were not using the test at all. In other words, half of those chosen would be successful. If the coefficient were unity, under these circumstances, *all* of those selected would be successful. That is, the lowest possible validity would result in the selection of employees 50% of whom will be successful, and the best possible validity would result in the selection of employees 100% of whom will be successful. When the validity of the test is .50, the use of the test results in the selection of employees 74% of whom will be successful. The practical usefulness of a test which increases the proportion of successful employees to this extent does not seem to be adequately expressed by the efficiency figure of 13% which is usually associated with a test of that validity. If we can choose the best one out of ten, a validity coefficient of .50 increases the proportion of successful employees to .84.

In general, with a given proportion of the present group being considered successful and with a given validity coefficient, the usefulness of the test with that validity increases as one is in a position to accept a smaller and smaller proportion of the candidates for employment.

Chart II shows the relationships between r and the selection ratio when one considers 50% of the present employee group to be successful. Selection ratios are plotted along the base line, and the per cents of employees chosen by the test who will be successful are plotted along the ordinate. Under these circumstances it will be clear that a new group cannot possibly be chosen which will contain less than 50% of successful people, even if we use a selection device of no validity at all. Hence, all curves start from 50% on the ordinate.

Note that with regard to this entire family of curves, the smaller the selection ratio, the larger is the percent of persons who will be successful among those selected by means of the test. Note also that in the case of correlations below about .70 these curves are positively accelerated toward the left. That is, under the conditions specified in this chart, the usefulness of a test with a validity less than .70 increases more and more rapidly as the selection ratio becomes smaller.

Not only does the usefulness of tests of such validity increase rapidly as the selection ratio is decreased, but their relative usefulness is still further emphasized if one considers what could be accomplished by a test if the validity coefficient were unity. This is shown in the topmost curve on the chart. Note that the per cent of persons chosen who will be successful increases as one cuts down the selection ratio until that point is reached where one is selecting 50% of the applicant group. At this point all of those selected will be successful and, naturally, no further gains can be made as one cuts the selection ratio further. The usefulness of the small correlations, on the other hand, continues to increase to the left of this point. Note that a validity coefficient of .50 is more useful when one is selecting only 20% of the applicant group than a correlation of unity would be if one were selecting 65% of the applicants.

It is our belief that a useful method of evaluating a validity coefficient in the employment situation is to ask oneself the question: If a given per cent of the present employee group is considered successful and if a given proportion of the applicant group is to be selected, what proportion will be successful in the new group selected by means of the test? How does this compare with the proportion of successful persons who could be chosen under equivalent circumstances with a selective device of no validity, and with a selective device of perfect validity?

We do not wish to imply that these relationships have been entirely unrecognized. The importance of the selection ratio as affecting the real usefulness of a validity coefficient was pointed out, for example, by Hull in a footnote (p. 276) in his book, *Aptitude Testing*.¹ Thurstone discusses the matter at some length in his book, *The Reliability and Validity of Tests*,² and the relationships can be worked out from *Computing Diagrams for the Tetrachoric Correlation Coefficient*.³

We believe, however, that the emphasis in current literature upon the k and E methods of interpreting correlation coefficients has led to some unwarranted pessimism on the part of many persons concerning the practical usefulness in an employment situation of validity coefficients in the range of those usually obtained. We believe that it may be of value to point out the very considerable improvement in selection efficiency which may be obtained with small correlation coefficients.

TABLES

Making use of Pearson's "Tables for Finding the Volumes of the Normal Bivariate Surface,"⁴ we have prepared a set of tables of the relationships among:

¹ Clark L. Hull. *Aptitude Testing*. Yonkers-on-Hudson, N. Y.: World Book Co., 1928.

² L. L. Thurstone. *The Reliability and Validity of Tests*. Ann Arbor, Mich.: Edwards Brothers, Inc., 1931. Pp 57-61.

³ L. Chesire, M. Saffir, and L. L. Thurstone. *Computing Diagrams for the Tetrachoric Correlation Coefficient*. Chicago The University of Chicago Book Store. 1933.

⁴ Karl Pearson. *Tables for Statisticians and Biometricians*. Part 2. London: Biometric Laboratory, University College, 1931. Pp. 78-109.

1. PROPORTION OF EMPLOYEES CONSIDERED SATISFACTORY, *i.e.*, the proportion of the group now employed (not chosen by means of the test) who are considered satisfactory according to present standards (Area $\frac{A + D}{A + B + C + D}$, Chart I).
2. SELECTION RATIO, *i.e.*, the proportion of applicants to be selected by means of the test.
3. r , the validity of the test.
4. PROPORTION SATISFACTORY AMONG THOSE SELECTED, *i.e.*, the proportion of applicants to be selected by means of the test who are expected to be satisfactory according to present standards (Area $\frac{A}{A + B}$, Chart I).

There are eleven tables, corresponding to eleven values of the PROPORTION OF EMPLOYEES CONSIDERED SATISFACTORY, these values being .05, .10, .20, .30, .40, .50, .60, .70, .80, .90, and .95.

The columns of each table correspond to eleven values of the SELECTION RATIO: .05, .10, .20, .30, .40, .50, .60, .70, .80, .90, and .95.

The rows of each table correspond to values of r from .00 to 1.00 by intervals of .05.

The argument of these tables is the PROPORTION SATISFACTORY AMONG THOSE SELECTED.

For example, if .60 or 60% of the present employees are considered satisfactory, and if the best .30 of applicants are to be chosen by means of a test with a validity of .70, then .91, or 91%, of those selected can be expected to be satisfactory. Note that with test validities of zero and unity, the proportions satisfactory among those selected would be .60 and 1.00 respectively.

Tables of the Proportion Who Will be Satisfactory Among Those Selected, for Given Values of the Proportion of Present Employees Considered Satisfactory, the Selection Ratio, and r

Proportion of Employees Considered Satisfactory = .05
Selection Ratio

r	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
.00	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
.05	.06	.06	.06	.06	.06	.05	.05	.05	.05	.05	.05
.10	.07	.07	.07	.06	.06	.06	.06	.05	.05	.05	.05
.15	.09	.08	.07	.07	.07	.06	.06	.06	.05	.05	.05
.20	.11	.09	.08	.08	.07	.07	.06	.06	.06	.05	.05
.25	.12	.11	.09	.08	.08	.07	.07	.06	.06	.05	.05
.30	.14	.12	.10	.09	.08	.07	.07	.06	.06	.05	.05
.35	.17	.14	.11	.10	.09	.08	.07	.06	.06	.05	.05
.40	.19	.16	.12	.10	.09	.08	.07	.07	.06	.05	.05
.45	.22	.17	.13	.11	.10	.08	.08	.07	.06	.06	.05
.50	.24	.19	.15	.12	.10	.09	.08	.07	.06	.06	.05
.55	.28	.22	.16	.13	.11	.09	.08	.07	.06	.06	.05
.60	.31	.24	.17	.13	.11	.09	.08	.07	.06	.06	.05
.65	.35	.26	.18	.14	.11	.10	.08	.07	.06	.06	.05
.70	.39	.29	.20	.15	.12	.10	.08	.07	.06	.06	.05
.75	.44	.32	.21	.15	.12	.10	.08	.07	.06	.06	.05
.80	.50	.35	.22	.16	.12	.10	.08	.07	.06	.06	.05
.85	.56	.39	.23	.16	.12	.10	.08	.07	.06	.06	.05
.90	.64	.43	.24	.17	.13	.10	.08	.07	.06	.06	.05
.95	.73	.47	.25	.17	.13	.10	.08	.07	.06	.06	.05
1.00	1.00	.50	.25	.17	.13	.10	.08	.07	.06	.06	.05

Proportion of Employees Considered Satisfactory = .10
Selection Ratio

r	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
.00	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
.05	.12	.12	.11	.11	.11	.11	.11	.10	.10	.10	.10
.10	.14	.13	.13	.12	.12	.11	.11	.11	.11	.10	.10
.15	.16	.15	.14	.13	.13	.12	.12	.11	.11	.10	.10
.20	.19	.17	.15	.14	.14	.13	.12	.12	.11	.11	.10
.25	.22	.19	.17	.16	.14	.13	.13	.12	.11	.11	.10
.30	.25	.22	.19	.17	.15	.14	.13	.12	.12	.11	.10
.35	.28	.24	.20	.18	.16	.15	.14	.13	.12	.11	.10
.40	.31	.27	.22	.19	.17	.16	.14	.13	.12	.11	.10
.45	.35	.29	.24	.20	.18	.16	.15	.13	.12	.11	.10
.50	.39	.32	.26	.22	.19	.17	.15	.13	.12	.11	.11
.55	.43	.36	.28	.23	.20	.17	.15	.14	.12	.11	.11
.60	.48	.39	.30	.25	.21	.18	.16	.14	.12	.11	.11
.65	.53	.43	.32	.26	.22	.18	.16	.14	.12	.11	.11
.70	.58	.47	.35	.27	.22	.19	.16	.14	.12	.11	.11
.75	.64	.51	.37	.29	.23	.19	.16	.14	.12	.11	.11
.80	.71	.56	.40	.30	.24	.20	.17	.14	.12	.11	.11
.85	.78	.62	.43	.31	.25	.20	.17	.14	.12	.11	.11
.90	.86	.69	.46	.33	.25	.20	.17	.14	.12	.11	.11
.95	.95	.78	.49	.33	.25	.20	.17	.14	.12	.11	.11
1.00	1.00	1.00	.50	.33	.25	.20	.17	.14	.13	.11	.11

Proportion of Employees Considered Satisfactory = .20
Selection Ratio

r	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
.00	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
.05	.23	.23	.22	.22	.21	.21	.21	.21	.20	.20	.20
.10	.26	.25	.24	.23	.23	.22	.22	.21	.21	.21	.20
.15	.30	.28	.26	.25	.24	.23	.23	.22	.21	.21	.20
.20	.33	.31	.28	.27	.26	.25	.24	.23	.22	.21	.21
.25	.37	.34	.31	.29	.27	.26	.24	.23	.22	.21	.21
.30	.41	.37	.33	.30	.28	.27	.25	.24	.23	.21	.21
.35	.45	.41	.36	.32	.30	.28	.26	.24	.23	.22	.21
.40	.49	.44	.38	.34	.31	.29	.27	.25	.23	.22	.21
.45	.54	.48	.41	.36	.33	.30	.28	.26	.24	.22	.21
.50	.59	.52	.44	.38	.35	.31	.29	.26	.24	.22	.21
.55	.63	.56	.47	.41	.36	.32	.29	.27	.24	.22	.21
.60	.68	.60	.50	.43	.38	.34	.30	.27	.24	.22	.21
.65	.73	.64	.53	.45	.39	.35	.31	.27	.25	.22	.21
.70	.79	.69	.56	.48	.41	.36	.31	.28	.25	.22	.21
.75	.84	.74	.60	.50	.43	.37	.32	.28	.25	.22	.21
.80	.89	.79	.64	.53	.45	.38	.33	.28	.25	.22	.21
.85	.94	.85	.69	.56	.47	.39	.33	.28	.25	.22	.21
.90	.98	.91	.75	.60	.48	.40	.33	.29	.25	.22	.21
.95	1.00	.97	.82	.64	.50	.40	.33	.29	.25	.22	.21
1.00	1.00	1.00	1.00	.67	.50	.40	.33	.29	.25	.22	.21

Proportion of Employees Considered Satisfactory = .30
Selection Ratio

r	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
.00	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
.05	.34	.33	.33	.32	.32	.31	.31	.31	.31	.30	.30
.10	.38	.36	.35	.34	.33	.33	.32	.32	.31	.31	.30
.15	.42	.40	.38	.36	.35	.34	.33	.33	.32	.31	.31
.20	.46	.43	.40	.38	.37	.36	.34	.33	.32	.31	.31
.25	.50	.47	.43	.41	.39	.37	.36	.34	.33	.32	.31
.30	.54	.50	.46	.43	.40	.38	.37	.35	.33	.32	.31
.35	.58	.54	.49	.45	.42	.40	.38	.36	.34	.32	.31
.40	.63	.58	.51	.47	.44	.41	.39	.37	.34	.32	.31
.45	.67	.61	.55	.50	.46	.43	.40	.37	.35	.32	.31
.50	.72	.65	.58	.52	.48	.44	.41	.38	.35	.33	.31
.55	.76	.69	.61	.55	.50	.46	.42	.39	.36	.33	.31
.60	.81	.74	.64	.58	.52	.47	.43	.40	.36	.33	.31
.65	.85	.78	.68	.60	.54	.49	.44	.40	.37	.33	.32
.70	.89	.82	.72	.63	.57	.51	.46	.41	.37	.33	.32
.75	.93	.86	.76	.67	.59	.52	.47	.42	.37	.33	.32
.80	.96	.90	.80	.70	.62	.54	.48	.42	.37	.33	.32
.85	.99	.94	.85	.74	.65	.56	.49	.43	.37	.33	.32
.90	1.00	.98	.90	.79	.68	.58	.49	.43	.37	.33	.32
.95	1.00	1.00	.96	.85	.72	.60	.50	.43	.37	.33	.32
1.00	1.00	1.00	1.00	1.00	.75	.60	.50	.43	.38	.33	.32

Proportion of Employees Considered Satisfactory = .40
Selection Ratio

r	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
.00	.40	.40	.40	.40	.40	.40	.40	.40	.40	.40	.40
.05	.44	.43	.43	.42	.42	.42	.41	.41	.41	.40	.40
.10	.48	.47	.46	.45	.44	.43	.42	.42	.41	.41	.40
.15	.52	.50	.48	.47	.46	.45	.44	.43	.42	.41	.41
.20	.57	.54	.51	.49	.48	.46	.45	.44	.43	.41	.41
.25	.61	.58	.54	.51	.49	.48	.46	.45	.43	.42	.41
.30	.65	.61	.57	.54	.51	.49	.47	.46	.44	.42	.41
.35	.69	.65	.60	.56	.53	.51	.49	.47	.45	.42	.41
.40	.73	.69	.63	.59	.56	.53	.50	.48	.45	.43	.41
.45	.77	.72	.66	.61	.58	.54	.51	.49	.46	.43	.42
.50	.81	.76	.69	.64	.60	.56	.53	.49	.46	.43	.42
.55	.85	.79	.72	.67	.62	.58	.54	.50	.47	.44	.42
.60	.89	.83	.75	.69	.64	.60	.55	.51	.48	.44	.42
.65	.92	.87	.79	.72	.67	.62	.57	.52	.48	.44	.42
.70	.95	.90	.82	.76	.69	.64	.58	.53	.49	.44	.42
.75	.97	.93	.86	.79	.72	.66	.60	.54	.49	.44	.42
.80	.99	.96	.89	.82	.75	.68	.61	.55	.49	.44	.42
.85	1.00	.98	.93	.86	.79	.71	.63	.56	.50	.44	.42
.90	1.00	1.00	.97	.91	.82	.74	.65	.57	.50	.44	.42
.95	1.00	1.00	.99	.96	.87	.77	.66	.57	.50	.44	.42
1.00	1.00	1.00	1.00	1.00	1.00	.80	.67	.57	.50	.44	.42

Proportion of Employees Considered Satisfactory = .50
Selection Ratio

r	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
.00	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50
.05	.54	.54	.53	.52	.52	.52	.51	.51	.51	.50	.50
.10	.58	.57	.56	.55	.54	.53	.53	.52	.51	.51	.50
.15	.63	.61	.58	.57	.56	.55	.54	.53	.52	.51	.51
.20	.67	.64	.61	.59	.58	.56	.55	.54	.53	.52	.51
.25	.70	.67	.64	.62	.60	.58	.56	.55	.54	.52	.51
.30	.74	.71	.67	.64	.62	.60	.58	.56	.54	.52	.51
.35	.78	.74	.70	.66	.64	.61	.59	.57	.55	.53	.51
.40	.82	.78	.73	.69	.66	.63	.61	.58	.56	.53	.52
.45	.85	.81	.75	.71	.68	.65	.62	.59	.56	.53	.52
.50	.88	.84	.78	.74	.70	.67	.63	.60	.57	.54	.52
.55	.91	.87	.81	.76	.72	.69	.65	.61	.58	.54	.52
.60	.94	.90	.84	.79	.75	.70	.66	.62	.59	.54	.52
.65	.96	.92	.87	.82	.77	.73	.68	.64	.59	.55	.52
.70	.98	.95	.90	.85	.80	.75	.70	.65	.60	.55	.53
.75	.99	.97	.92	.87	.82	.77	.72	.66	.61	.55	.53
.80	1.00	.99	.95	.90	.85	.80	.73	.67	.61	.55	.53
.85	1.00	.99	.97	.94	.88	.82	.76	.69	.62	.55	.53
.90	1.00	1.00	.99	.97	.92	.86	.78	.70	.62	.56	.53
.95	1.00	1.00	1.00	.99	.96	.90	.81	.71	.63	.56	.53
1.00	1.00	1.00	1.00	1.00	1.00	1.00	.83	.71	.63	.56	.53

Proportion of Employees Considered Satisfactory = .60
Selection Ratio

r	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
.00	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
.05	.64	.63	.63	.62	.62	.62	.61	.61	.61	.60	.60
.10	.68	.67	.65	.64	.64	.63	.63	.62	.61	.61	.60
.15	.71	.70	.68	.67	.66	.65	.64	.63	.62	.61	.61
.20	.75	.73	.71	.69	.67	.66	.65	.64	.63	.62	.61
.25	.78	.76	.73	.71	.69	.68	.66	.65	.63	.62	.61
.30	.82	.79	.76	.73	.71	.69	.68	.66	.64	.62	.61
.35	.85	.82	.78	.75	.73	.71	.69	.67	.65	.63	.62
.40	.88	.85	.81	.78	.75	.73	.70	.68	.66	.63	.62
.45	.90	.87	.83	.80	.77	.74	.72	.69	.66	.64	.62
.50	.93	.90	.86	.82	.79	.76	.73	.70	.67	.64	.62
.55	.95	.92	.88	.84	.81	.78	.75	.71	.68	.64	.62
.60	.96	.94	.90	.87	.83	.80	.76	.73	.69	.65	.63
.65	.98	.96	.92	.89	.85	.82	.78	.74	.70	.65	.63
.70	.99	.97	.94	.91	.87	.84	.80	.75	.71	.66	.63
.75	.99	.99	.96	.93	.90	.86	.81	.77	.71	.66	.63
.80	1.00	.99	.98	.95	.92	.88	.83	.78	.72	.66	.63
.85	1.00	1.00	.99	.97	.95	.91	.86	.80	.73	.66	.63
.90	1.00	1.00	1.00	.99	.97	.94	.88	.82	.74	.67	.63
.95	1.00	1.00	1.00	1.00	.99	.97	.92	.84	.75	.67	.63
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.86	.75	.67	.63

Proportion of Employees Considered Satisfactory = .70
Selection Ratio

r	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
.00	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70	.70
.05	.73	.73	.72	.72	.72	.71	.71	.71	.71	.70	.70
.10	.77	.76	.75	.74	.73	.73	.72	.72	.71	.71	.70
.15	.80	.79	.77	.76	.75	.74	.73	.73	.72	.71	.71
.20	.83	.81	.79	.78	.77	.76	.75	.74	.73	.71	.71
.25	.86	.84	.81	.80	.78	.77	.76	.75	.73	.72	.71
.30	.88	.86	.84	.82	.80	.78	.77	.75	.74	.72	.71
.35	.91	.89	.86	.83	.82	.80	.78	.76	.75	.73	.71
.40	.93	.91	.88	.85	.83	.81	.79	.77	.75	.73	.72
.45	.94	.93	.90	.87	.85	.83	.81	.78	.76	.73	.72
.50	.96	.94	.91	.89	.87	.84	.82	.80	.77	.74	.72
.55	.97	.96	.93	.91	.88	.86	.83	.81	.78	.74	.72
.60	.98	.97	.95	.92	.90	.87	.85	.82	.79	.75	.73
.65	.99	.98	.96	.94	.92	.89	.86	.83	.80	.75	.73
.70	1.00	.99	.97	.96	.93	.91	.88	.84	.80	.76	.73
.75	1.00	1.00	.98	.97	.95	.92	.89	.86	.81	.76	.73
.80	1.00	1.00	.99	.98	.97	.94	.91	.87	.82	.77	.73
.85	1.00	1.00	1.00	.99	.98	.96	.93	.89	.84	.77	.74
.90	1.00	1.00	1.00	1.00	.99	.98	.95	.91	.85	.78	.74
.95	1.00	1.00	1.00	1.00	1.00	.99	.98	.94	.86	.78	.74
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	.88	.78	.74

