ABSTRACT
          A study examined the validity of using the Minnesota
Job Description Questionnaire to measure occupational reinforcer
patterns (ORPs). Although ORP profiles (twenty-one adjusted scales)
were developed a decade ago to operationalize a key variable in the
Theory of Work Adjustment (Lofquist and Davis, 1969), little validity
evidence exists. An examination of the process by which adjusted ORP
scores are created from the ipsative unadjusted scores suggested
several threats to validity. In addition, correlations of the ORP
scales with Census Bureau and Department of Labor Data on pay,
education, occupational self-direction, and seventeen worker trait
requirements show that (1) among the seven adjusted ORP scales for
which there was good validation criteria, five were of questionable
validity, (2) among the remaining fourteen adjusted reinforcers,
several do not correlate in intelligible ways with the job
characteristics data, and (3) the adjusted scores are no more valid
than are the unadjusted scores. Discriminant analyses showed that the
two sets of scales discriminate equally well among occupations, but
different reinforcers are most important for separating the groups.
The conclusion from the discriminant analyses is that whereas the
unadjusted scales provide limited but useful information, the
adjusted scores provide no new information and may be less
interpretable than the unadjusted scores. Some specific recommended
uses of the ORP scores should be examined. (Possible explanations for
the failure of the scaling method to produce valid absolute ORP
scores are discussed.) (Author/PV)

HOW VALID ARE OCCUPATIONAL REINFORCER

PATTERN SCORES?

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Introductory Statement

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through four programs to achieve its objectives. The Studies in School Desegregation program applies the basic theories of social organization of schools to study the internal conditions of desegregated schools, the feasibility of alternative desegregation policies, and the interrelation of school desegregation with other equity issues such as housing and job desegregation. The School Organization program is currently concerned with authority-control structures, task structures, reward systems, and peer group processes in schools. It has produced a large-scale study of the effects of open schools, has developed Student Team Learning Instructional processes for teaching various subjects in elementary and secondary schools, and has produced a computerized system for school-wide attendance monitoring. The School Processes and Career Development program is studying transitions from high school to post secondary institutions and the role of schooling in the development of career plans and the actualization of labor market outcomes. The Studies in Delinquency and School Environments program is examining the interaction of school environments, school experiences, and individual characteristics in relation to in-school and later-life delinquency.

This report, prepared by the School Processes and Career Development program, examines the validity of using the Minnesota Job Description Questionnaire to measure occupational reinforcer patterns.

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Abstract

Although occupational reinforcer pattern (ORP) profiles were developed a decade ago to operationalize a key variable in the Theory of Work Adjustment (Lofquist & Dawis, 1969), little evidence exists to support the validity of those scores. This study tests the assumption that the 21 adjusted ORP scales are valid for their intended purpose—to measure absolute levels of reinforcers in different occupations. Specifically, an examination of the process by which adjusted ORP scores are created from the ipsative unadjusted scores suggests several threats to validity. In addition, correlations of the ORP scales with data from the Census Bureau and the Department of Labor on pay, education, occupational self-direction, and 17 worker trait requirements show that: (a) among the 7 adjusted ORP scales for which there are good validation criteria, one reinforcer seems valid, one is clearly not valid, and the other five are of questionable validity, (b) among the remaining 14 adjusted reinforcers, several do not correlate in intelligible ways with the job characteristics data, and (c) the adjusted scores are no more valid than are the unadjusted scores—a finding that contradicts the developers' statements about the relative validity of the two sets of scores. Discriminant analyses with the adjusted and unadjusted scores show that the two sets of scales discriminate equally well among occupations, but that different reinforcers are most important for separating the groups. The conclusion from the discriminant analyses is that, whereas the unadjusted scales provide limited but useful information, the adjusted scores not only fail to provide any new information but they also may be less interpretable than the unadjusted scores. Some specific recommended uses of the ORP scores should be reexamined. Possible explanations for the failure of the scaling method to produce valid absolute ORP scores are discussed.

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Acknowledgments

How Valid are Occupational Reinforcer Pattern Scores?

A fundamental assumption in much vocational and industrial psychology is that a good match of a worker's abilities, interests, and needs with the requirements and reinforcers of a job promotes satisfaction and performance. The Minnesota Work Adjustment Project represents the most systematic and comprehensive attempt to develop both a theory of work adjustment based on this assumption (Lofquist & Dawis, 1969) and a set of methods for measuring person-job match. The Minnesota Satisfactoriness Scales (Gibson, Weiss, Dawis & Lofquist, 1970) and the Minnesota Satisfaction Questionnaire (Weiss, Dawis, England & Lofquist, 1967) measure worker satisfactoriness and satisfaction. According to the theory, satisfactoriness depends upon the match between worker abilities, as measured by the General Aptitude Test Battery (U.S. Department of Labor, 1970), and job requirements, as measured by the Minnesota Job Requirements Questionnaire (Desmond & Weiss, 1973). According to the theory, satisfaction depends on the match between worker needs. as measured by the Minnesota Importance Questionnaire (Gay, Weiss, Hendel, Dawis & Lofquist, 1971), and job reinforcers, as measured by the Minnesota Job Description Questionnaire (Borgen, Weiss, Tinsley, Dawis & Lofquist, 1972; Rosen, Hendel, Weiss, Dawis & Lofquist, 1972). Thus there is a highly structured measurement device for each of the key variables. The major objective of this theory and its associated measures is to help workers choose occupations in which they will be satisfied, perform well, and persist.

This report assesses the validity of one of these key measurement devices—the Minnesota Job Description Questionnaire (MJDQ) which is used to measure occupational reinforcer patterns (ORPs). ORP profiles have been published for 148 occupations (Rosen et al., 1972; Borgen et al., 1972), but evidence for the validity of these reinforcer patterns remains limited. The Work

Adjustment measurement devices are not widely used at present, but it is desirable to have further evidence of their validity should they be adopted in applied counseling activities. In addition, examination of the construct validity of the ORP profiles reveals the hazards of applying psychometric scaling techniques to the measurement of job attributes without first assessing their applicability to the specific scaling problem.

Borgen, Weiss, Tinsley, Dawis and Lofquist (1968) have summarized validity evidence for the first 81 occupations for which reinforcer patterns were available. Of the 22 scales of the MJDQ (21 reinforcers and the neutral point), all were useful to some extent in distinguishing among the 81 occupations. Although F-tests from one-way ANOVA were significant for every scale, accompanying omega-squared statistics ranged from .07 to .37. A cluster analysis based on correlations between the occupational profiles resulted in 9 meaningful occupational groups. One-way ANOVA for the cluster mean reinforcer scale scores were all significant with omegas-squared between .01 and .25. Borgen et al. (1968) state that the scale scores of specific occupations and clusters make conceptual sense, but they provide few examples and do not validate the scores against external criteria. More recent analyses based on all 148 occupations for which ORP profiles are published yield essentially the same results (Rounds, Shubsachs, Dawis & Lofquist, Note 1; Rosen et al., 1972).

The only instances in which occupational reinforcer patterns have been compared to external criteria have been studies testing the validity of Holland's (1973) occupational typology (Rounds et al., 1978, Note 1; Toenjes & Borgen, 1974; Gottfredson, 1978b). The results of the Rounds et al. and Toenjes and Borgen studies are conflicting, and the Gottfredson report concludes that reinforcer pattern scores are not useful for measuring absolute levels of reinforcement.

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If there were considerable evidence supporting the propositions of the theory of Work Adjustment, this could be considered at least weak evidence for the validity of the ORP profiles. However, evidence for the most relevant proposition is conflicting. Several studies (Betz, 1969; Lofquist & Dawis, 1969) have found job satisfaction to be correlated with the degree of correspondence between a worker's needs and ORP profile, but others (Warren, 1970; Taylor, 1971; Willoughby, 1971; Vessey, 1973) found no evidence for such a relation. More evidence is needed, therefore, about the validity of some or all reinforcer scales for use in either counseling or research on job classification.

The present report addresses three questions related to this concern:

1. Do the reinforcer scales show convergent validity with independent measures of the same or similar reinforcers, and divergent validity with measures of unrelated constructs?

2. How does the method of constructing the reinforcer pattern profiles affect the validity of the scores?

3. Should reinforcer scores be interpreted somewhat differently in counseling and research than they now are?

These questions are answered in the following ways: (a) The procedure for deriving occupational reinforcer patterns is described. As discussed further below, the procedure consists of two steps, first developing a set of ipsative scores referred to as unadjusted scores and then transforming these scores to reflect absolute levels of reinforcement. The latter are referred to as adjusted scores and they are the scores published by the Work Adjustment Project. (b) Potential problems in interpreting both adjusted and unadjusted scores are discussed and illustrated. (c) The properties of both kinds of reinforcer scores are compared. Although adjusted and unadjusted

scores differ, many of their properties are similar because of the method used to convert unadjusted to adjusted scores. Knowledge of the ways in which the two scores are related is required because superficial differences in their properties are sometimes assumed to imply that the adjusted scores are more valid. (d) The construct validity of eight reinforcer scales is examined in detail by correlating them with U.S. Census and Employment Service data about occupational characteristics. (e) Hypotheses concerning differences in the substantive interpretation of adjusted and unadjusted scores are tested.

The Derivation and Interpretation of Occupational Reinforcer Patterns

Occupational reinforcer scores are obtained for each occupation in identical but separate applications of Gulliksen's (1964; Gulliksen & Tucker, 1961) procedure for scaling comparative judgment data. Supervisors of, and workers in, a particular job are asked to rank 21 reinforcers (shown in Table 2) according to how well they describe that job. Rankings of reinforcers are obtained from each rater in a paired comparisons procedure using balanced incomplete blocks of five items each. The proportions of raters (say elementary school teachers) who rate each reinforcer (say compensation) as more descriptive of their job than each other reinforcer in turn (security, fairness of company policies, etc.) are then calculated. The resulting 21 proportions (.50 being used as the proportion of times a reinforcer would have been ranked over itself, had such a comparison been made) are averaged for the reinforcer in question and then the average is transformed to a normal deviate (z) score. These transformed scores are referred to as the unadjusted reinforcer scores for an occupation.

The unadjusted scores are ipsative scores, that is, they provide a profile of the reinforcers that are most and least salient within an occu-

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pation. Because the scores are ipsative, <u>interoccupational comparisons</u> using
the unadjusted scores should be limited to statements about differences in
profiles such as "elementary school teachers say that security is a more
prominent reinforcer than is compensation in their profession, whereas the
opposite is true for real estate salesmen." The unadjusted scores cannot
be used to make statements about which occupation provides higher absolute
levels of either compensation or security. To enable comparisons of the
absolute level of reinforcers to be made, the Minnesota group has devised
<u>adjusted reinforcer scores</u> by establishing a zero point for each of the
occupations which is then used to adjust scores. To establish this zero
point, raters are asked to say whether each reinforcer is present or not
present in an occupation. The average proportion of the 21 reinforcers
judged not to be present in the occupation is converted to a normal deviate
score and becomes the "neutral point." Reinforcers with unadjusted scores
above this point are judged to be present in the job and those below are
judged to be absent. To create the adjusted scores, the neutral point for
each occupation (e.g., z scores of -.869 for elementary teachers and -.674 for
teacher aide) is subtracted from all 21 unadjusted scores within that occupa-
tion.

Despite the developers' intentions, neither theory nor evidence imply
that this procedure provides absolute scores which are comparable across
occupations. There is nothing <u>explicitly</u> in common across the assessments
by which to create a common scale (Angoff, 1971). For example, raters were
not asked to compare levels of reinforcement for the same reinforcer in
different occupations. Neither were raters asked to rate more than one
occupation. Note that the only thing that is changed by adjusting scores
is the level of a profile. The shape of occupational reinforcer pattern

profiles is not changed at all by the adjustment procedure. Stated another way, the scale intervals remain exactly the same within each occupation; only the zero point is shifted. As Hicks (1970) notes, ipsative scores cannot be transformed to absolute scores by a simple mathematical transformation.

An example using teachers and elementary school aides provides a concrete illustration of the failure of the adjustment process to create absolute scores comparable across occupations. For elementary school teachers, -.869 was subtracted from the unadjusted scores of .03 (working conditions), -.75 (compensation), and .83 (try out own ideas) to provide adjusted scores of .90, .12, 1.70. For teacher aide, the scores for the same three reinforcers were adjusted from .53, -.42, and -.04 to 1.21, .26, and .63. Although it is plausible that elementary teachers have more freedom to try out their own ideas than do teacher aides (adjusted scores of 1.70 and .63, respectively), it is not plausible that teachers enjoy poorer absolute working conditions and compensation than teacher aides (respectively, .90 and .12 for teachers, but 1.21 and .26 for aides). It is reasonable, however, to conclude from the unadjusted scores that <u>relative to the other reinforcers</u> compensation and working conditions are more important in teacher aide jobs than in elementary teaching jobs. This is but a single example of the failure of adjustment to provide absolute scores; the following sections examine the properties of the two kinds of scores more analytically.

Comparison of unadjusted and adjusted scores

It is argued here that the two sets of scores provide different types of information, and hence that it is not obvious which set is more useful for different purposes. Because this conclusion contradicts the advice of the developers, who state that the adjusted scores should always be used (Borgen

et al., 1972:8; Rosen et al., 1972:8), it is also necessary to examine the properties that seem to suggest differences in the validity of the two sets of scores and to note important properties of the scores that are easily overlooked.

Correlations among the adjusted and unadjusted scores are shown in Table 1 for the 148 occupations for which ORP data are published. The diagonal contains the correlation between the corresponding adjusted and unadjusted scales. The table also shows the correlation of the 21 reinforcer scales with the prestige level of the occupations. (The prestige scale is explained further below.) This table reveals some of the differences between the two sets of scores: correlations are higher and there are fewer negative correlations in the set of adjusted scores than in the unadjusted set. The latter point, in particular, has been taken (anonymous reviewer, 1978) as evidence of the greater validity of the adjusted scores. But these two differences are an artifact of the adjustment procedure and the two sets of correlations themselves correlate .99. By adding the same constant to each reinforcer within an occupation (a different constant for each occupation), all correlations are necessarily made more positive and the number of negative correlations is thereby reduced. Although the number of negative correlations is reduced, implausible correlations remain--especially for reinforcers that are negatively correlated with prestige. The negative correlation of "fairness of company policies" with prestige is implausible. The positive but extremely low correlation of "paid well relative to other workers" diverges sharply from other evidence about the association of pay and prestige (e.g., Reiss et al., 1961). Results to be presented later in this paper show that the correlation between the pay and prestige of occupations is about .8.

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Insert Table 1 About Here

Turning now to a second type of correlation matrix, we find a different

pattern (which is unnecessary to present in table form). Correlations among

occupations (i.e., among the row vectors rather than the column vectors of a

matrix where each of the 148 rows consists of the 21 scale scores for a

different occupation) are exactly the same for the adjusted and unadjusted

scores. This is because the profile shapes are not changed in the adjust-

ment process. Elevation of the profiles changes, but elevation does not

affect these correlations in any way.

Analyses based on such correlations among occupational profiles will

lead to the same results whether adjusted or unadjusted scores are used.

For example, the cluster analysis reported by Rosen et al. (1972) would be

the same had they used unadjusted instead of adjusted scores. This is not

true for analyses using correlations among items. Although the shift

upwards in the item correlations is systematic when the adjusted scores are

created, the information reflected in those correlations differs from that

reflected in the unadjusted scores. The following paragraphs describe what

that shift in information entails.

The first thing to note is that the correlation between the prestige

of occupations and their neutral points is .50 (see Table 1). (For ease of

interpretation, the sign of the value of the neutral point has been reversed.)

Thus when scores are adjusted by adding the (sign-reversed) neutral point,

more is added to every reinforcer within an occupation when the occupation

is high prestige than when it is low prestige. The result is that if the

resulting scores are treated as at least interval level measures, all

occupations become less different in those reinforcers that characterize

low-prestige jobs and more different in those reinforcers that characterize high-prestige jobs.

Table 2 (with data taken from Gottfredson, 1978b) illustrates this phenomenon. The first two columns show the correlations of the 21 unadjusted and adjusted scales with prestige level of the occupations. The reinforcers are listed from high to low according to the correlation of the unadjusted scales with prestige. The third and fourth columns show the variance of the scale scores. The last two columns are omegas-squared from an analysis of the association between the 21 individual scales and a 17-category occupational classification. (The 17-category classification was constructed from Holland's [1973] 6 categories of work and 3 broad prestige levels, one of the possible 18 cells being vacant.)

The third and fourth columns show that the variance in reinforcer scores decreases for some reinforcers but increases for others when scores are adjusted. Variance increases for reinforcers prominent in high-prestige jobs (those at the top of the list) and decreases for reinforcers prominent in low-prestige jobs (those listed at the bottom). The increase in variance (column 4 minus column 3) is correlated .89 with the reinforcer's relation to prestige (column 1).

Insert Table 2 About Here

The implications of these changes in variance can be traced with the aid of columns 5 and 6, which show the association between each reinforcer and the 17-category job classification. Looking first at the reinforcers at the top of the list, it is apparent that omegas-squared are larger for the adjusted scores. Further down the list, however, the omegas-squared are frequently higher for the unadjusted scores. Omegas-squared tend to be highest

for adjusted scores highly correlated with prestige; they tend to be highest for unadjusted scores at the two ends of the continuum--for reinforcers highly correlated positively or negatively with prestige. Although Table 2 shows analyses for only a single scale at a time, it suggests that both sets of scores distinguish job categories equally well (e.g., average omegas-squared are the same for both) but that they differ in which particular reinforcers make the best distinctions.

The threats to validity discussed above can be summarized as follows. (a) It is not clear logically that the adjustment procedure should produce absolute scores comparable across occupations. Profile elevation is changed, but profile shape remains unaltered. (b) Some of the scores--particularly for scales negatively correlated with prestige (and the neutral point)--do not seem plausible. (c) The scale developers state that the unadjusted scales are not valid for making interoccupational comparisons of absolute reinforcer levels but that the adjusted scales are valid for that purpose. Demonstrations of validity have rested primarily on the ability of the scales to distinguish among occupations. However, Table 2 indicates that both the unadjusted and the adjusted scores distinguish equally well among occupations. (d) The reinforcers that distinguish best among occupations differ depending on whether adjusted or unadjusted scores are used. This difference, as well as others discussed earlier, is an artifact of the adjustment process and implies nothing about the relative validity of the two sets of scores.

Strategy for Examining the Validity of Reinforcer Scales

This paper further examines the construct validity of individual adjusted reinforcer scales by correlating them with external measures of the same

variables. Eleven predictions are made that should be true if the adjusted scales are valid for measuring absolute levels of reinforcement. In addition, discriminant analyses are performed to examine the efficiency of adjusted and unadjusted scores for discriminating among occupations.

Validity of individual adjusted reinforcer scales. Adjusted scores are intended to measure the absolute level of a reinforcer within an occupation and ideally should correlate highly with other measures of the same reinforcer. The U.S. Bureau of the Census (1973), the Dictionary of Occupational Titles (U.S. Department of Labor, 1965), and Temme (1975) provide estimates of job characteristics, some of which are similar to reinforcers measured by the Work Adjustment Project. The 21 job characteristics examined here include pay, years of education, prestige, self-direction, 12 Dictionary of Occupational Titles (DOT) temperaments, and 5 DOT interests. A total of eleven predictions is made for eight of the reinforcers; these are listed in Table 3.

Insert Table 3 About Here

Judgments about the validity of the adjusted reinforcer scales will be based on three considerations. First, an adjusted reinforcer scale should correlate higher with the job characteristic it is supposed to reflect (the validation criterion) than with any other criterion. Second, this correlation (the validity coefficient) should be appreciably higher than the average correlation of that reinforcer with other job characteristics. And third, because adjusted scores are asserted to be more valid for measuring absolute levels of reinforcement than are unadjusted scores, the validation criteria should be more strongly related to the former than

to the latter scales. The greater validity of an adjusted reinforcer scale should be shown by a greater gap between its correlation with the validation criterion and its average correlation with the other criteria than is the case for the unadjusted scores. The gaps between validity coefficients and average correlations rather than the validity coefficients themselves are compared because it is possible that all correlations are higher in one set than in the other.

Differentiation among occupational groups. Discriminant analyses are performed with both adjusted and unadjusted scores to determine how each set of scales differentiates among occupational clusters identified by Rosen et al. (1972) using ORP profile data. On the basis of the evidence presented in Tables 1 and 2, five predictions are made. (a) Both sets of scores will account for the same amount of between-group variance. (b) Both sets will place the clusters in similar positions in multidimensional space. (c) Different discriminating variables will be most important in the two sets. (d) One major dimension will be highly correlated with prestige. (e) The prestige-related dimension will be defined by reinforcers highly descriptive of high-prestige jobs for adjusted scores, but by reinforcers descriptive of both high- and low-prestige jobs for unadjusted scores. Put another way, the unadjusted prestige-related discriminant function will be bipolar whereas the comparable adjusted discriminant function will be unipolar. In short, both analyses will produce intelligible results, but they will describe occupational clusters differently. If the results for adjusted scores can be predicted from a knowledge of the correlations among the unadjusted scores, the neutral (zero) point, and (to make predictions even easier) prestige, then it is likely that such results tell us nothing new. They may even distort what we might have learned from the unadjusted data.

Method

Published Census data on median income and years of education as well as scores for prestige, self-direction, and DOT interests and temperaments were assigned to the 148 ORF occupations. The DOT data were available for DOT occupational titles; the remaining data were available for the more highly aggregated detailed census titles. The DOT codes had been assigned previously to the 148 occupations by Dawis and Lofquist (1974). The Census bureau's <u>Alphabetical Index of Industries and Occupations</u> (1971) was used to assign the 148 occupations to detailed census titles, the 148 titles being distributed to 120 of the possible 428 categories. Two research assistants independently assigned the occupations to census categories and I resolved the 14 cases where the assignments differed. The job characteristics and their sources are described briefly below.

Job Characteristics Data

<u>Census data on pay and education</u>. Median income and median years of education were obtained from Table 1 of the Census Bureau's 1970 subject report on occupational characteristics (U.S. Bureau of the Census, 1973). These data are for the detailed occupational titles reported by males in the experienced civilian labor force.

<u>Dictionary of Occupational Titles (DOT) temperaments and interests</u>. The U.S. Employment Service has developed the DOT (U.S. Department of Labor, 1965) over the last four decades for the classification and placement of job seekers. The DOT characterizes over 20,000 job titles according to work activities, training requirements, and worker trait requirements. The DOT scores are estimates made by occupational analysts usually on the basis of observations of one or more jobs for each occupation (Committee

on Occupational Classification and Analysis, in press). Only the worker

trait requirements--interests and temperaments required by the job--are

used here. The 12 temperament items refer to different types of occupational

situations to which workers must adjust, such as working alone or doing re-

petitive work. The 5 interest items are bipolar items estimating the pre-

ferences for certain types of work activities or work experiences required

by the job, such as preferences for activities of a social rather than a

nonsocial nature. Descriptions of the items and how they were coded in this

study are provided in Table 4. Temperament and interest score were assigned

to the 148 occupations on the basis of DOT codes. Dawis and Lofquist (1974)

provided the data for 105 of the occupations. Data for the other 43 were

obtained from the DOT.

Insert Table 4 About Here

Self-Direction. Self-direction is an index of the ability of workers

in a specific job to determine how they will spend their time on that job.

T·e measure used here was originally developed by Kohn (1969) from ratings

of closeness of supervision, routinization of work, and substantive com-

plexity. Scores were assigned to the 148 occupations on the basis of de-

tailed census titles. Self-direction scores for the detailed census titles

have been estimated by Temme (1975).

Prestige. Occupational status or prestige has been the major dimension

along which occupations have been classified in sociology because of that

discipline's traditional emphasis on understanding the sources and conse-

quences of socioeconomic stratification and mobility. Several highly corre-

lated scales of occupational prestige or socioeconomic status (Duncan, 1961;

Temme, 1975; Treiman, 1977) have been developed for research on occupa-

tional attainment. These scales are all tied to ratings by the general

public of the general desirability of particular occupations, and the scales

can be considered measures of the general level of rewards provided by an

occupation. The scale used here and its derivation are described in detail

by Temme (1975).

Occupational Reinforcer Patterns (ORP) data. These data have already

been described, but the treatment of the neutral point, reinforcer item

names, and ORP occupational clusters should be clarified.

For ease of interpretation, the sign of the neutral point has been

reversed. The neutral point (before the sign is reversed) reflects judgments

about the number of reinforcers that are not present on the job and it ranges

from -1.10 to -.26. This negative value is subtracted from the unadjusted

reinforcer scores to produce adjusted scores. This subtraction is in effect

the same as adding a measure of the average rater's estimate of the number

of reinforcers present in that occupation to the unadjusted scores.

Publications by the Work Adjustment Project investigators use short

descriptors that do not always convey a clear conception of the full items.

To avoid such ambiguity in this paper, all reinforcer scales are referred to

by a shortened version of the items themselves. These versions of the items

are listed in Table 2. Further abbreviation is necessary in tables such as

Table 1. The labels used in Work Adjustment Project publications which

correspond to the list in Table 2 are, respectively, in descending order:

responsibility, creativity, ability utilization, achievement, autonomy,

social status, advancement, authority, social service, variety, recognition,

compensation, independence, security, working conditions, activity, moral

values, co-workers, supervision--technical, supervision--human relations,
and company policies and practices.

The discriminant analyses use clusters derived by Rosen et al. (1972)
using correlations among ORP profiles as the measure of similarity. For
reasons mentioned earlier, the clusters derived would be exactly the same
whether unadjusted or adjusted scores were used. Although they identified
12 clusters, some clusters have been combined with related clusters because
they are very small. Clusters I (N=16 occupations) and II (N=5) were com-
bined; Clusters V (N=13) and VI (N=2) were combined; Clusters VII (N=7)
and VIII (N=18) were combined; and Clusters XI (N=9) and XII (N=9) were
combined. These particular pairs of clusters were combined on the basis
of the correlations among the profiles in those clusters (Rosen et al.,
1972). (Results are much the same using 12 groups, and interested readers
are invited to write for a copy.)

Limitations

The job characteristics being used here to assess the validity of
the adjusted occupational reinforcer patterns data are in some cases of
questionable validity themselves. The validity of the prestige scale is
well studied (Temme, 1975; Treiman, 1977; Reiss, 1961), and the pay and
education data are the best available. The validity of the DOT interests
and temperaments is probably the most questionable. In addition, the pay
and education data assigned to the 148 occupations on the basis of detailed
census titles do not refer strictly only to those 148 titles because the
census titles are sometimes more inclusive. This unfortunate but necessary
use of data organized according to different occupational classifications
may be expected to attenuate validity estimates somewhat. Where possible,
judgments concerning the validity of the criterion scales are provided in the
text.

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Results

Correlations of Individual Reinforcer Scales with Validation Criteria

Correlations of the 21 reinforcers with 20 job characteristics are shown in Table 5 for adjusted scores and in Table 7 for unadjusted scores. Those correlations about which predictions were made in Table 3 are underlined. To help judge the size of these correlations, the last column provides average correlations for the relevant rows. This average is calculated from the absolute values of all correlations in a row except those in bold-face type. (The averages are retransformed z scores as suggested by McNemar, 1969:158).

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Insert Table 5 About Here
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Correlations with adjusted scores are discussed first because the predictions apply only to this set of scores. Then correlations with the unadjusted scores are discussed for purposes of comparison. A total of 11 predictions were made for 8 of the 21 reinforcers. The last one of the 11 predictions cannot be discussed because all 148 occupations scored the same on the criterion variable, Temperament 6. Temperament 6 (working alone and in physical isolation) apparently applies only to extreme cases of working alone.[1] The remaining 10 correlations for which predictions were made are all in the expected direction, but they vary considerably in size. In 3 of the 10 cases (predictions 1, 3, and 8), the reinforcer correlated more highly with the validation criterion than with the other job characteristics; in four cases (predictions 2, 6, 9, and 10), the correlations with the validation criteria are lower than they are with other job characteristics. Looking now at columns rather than rows of correlations for the

three best row cases, in only one case (prediction 8) does the validation criterion clearly correlate highest with the correct reinforcer. Thus, the validity coefficients provide unambiguous evidence for the validity of only one of the seven reinforcers for which validation criteria were available. More detailed results for the predictions are discussed below.

Insert Table 6 About Here

Predictions 1, 2, 3, and 4. "Making decisions on own" correlated .64 with self-direction but only -.37 with Temperament 3 (working under specific instructions). Temperament 3 may be a less valid measure than is the reinforcer "making decisions on own" because the reinforcer correlates in expected ways with other criteria. For example, that reinforcer correlates negatively with Temperament 2 (-.54, repetitive work) and positively with Temperament 4 (.52, planning and directing activities) and Interest 3/8 (.61, preferences for creative rather than routine activities) as well as with job characteristics such as pay (.50), education (.56), and prestige (.60) which are higher in decision-making jobs. "Try out own ideas" correlates highly with its two validation criteria--self-direction (.59) and Interest 3/8 (.66, preference for creative rather than routine activities).

However, "own decisions" and "own ideas" are not distinct reinforcers. Table 1 shows that they are themselves correlated .85, and the correlations shown in Table 5 for these two reinforcers are essentially the same. It is not clear that even the next three reinforcers ("use individual abilities," "feeling of accomplishment," and "plan work with little supervision") are distinct from the first two. Thus, although the evidence supports the validity of the first two reinforcers, they do not appear to measure dif-

ferent·constructs.

Predictions 5 and 6. "Have position of 'somebody' in the community"
correlates .51 with prestige but only -.32 with Interest 5/0 (preference
for tangible, productive satisfaction rather than the esteem of others).
Interest 5/0 may be a poor measure of status because Table 6 shows that it
correlated only -.44 with prestige. The correlations in Table 6 suggest
that Interest 5/0 primarily measures working with people versus things.

Although "having a position of 'somebody' in the community" corre-
lates .51 with prestige, it correlates almost as well with pay, education,
and self-dire ..--although presumably these all contribute to being
"somebody" in the community. Finally, and most importantly, five other
reinforcers correlate more highly with prestige than does the reinforcer
developed to measure it.

Prediction 7. The same comment can be made about "telling other
workers what to do" as for "having a position of 'somebody' in the community."
That is, although the reinforcer correlates highest with the validiation
criterion rather than with some other job characteristic, five other rein-
forcers correlate more highly with that criterion.

Prediction 8. "Do things for others" appears to be the most valid of
the eight reinforcers examined. The correlation of -.61 with Interest 4/9
(preference for nonsocial rather than social activities) is higher than all
the other correlations in the relevant row and column. In addition, the
other high correlations are with job characteristics associated with social
service jobs: education (.44), self-direction (.56), Temperament 5 (.62,
dealing with people), Temperament Y (-.45, dealing with precise limits),
Interest 1/6 (.47, preference for dealing with people rather than things),

and Interest 5/0 (-.52, preference for activities resulting in tangible, productive satisfaction rather than esteem).

Prediction 9. "Work is different every day" correlates only .06 with Temperament 1 (variety of duties characterized by frequent change). This reinforcer does correlate -.43 with a related characteristic, Temperament 2 (repetitive operations carried out according to set procedures). These two correlations suggest that Temperament 1 may be a poor measure and cannot be used to judge the validity of the reinforcer.

Prediction 10. The reinforcer "paid well relative to other workers" is clearly not valid. The correlation of this reinforcer with pay is only .28. Correlations are almost as high with Temperament 5 (-.25, dealing with people), Interest 1/6 (-.24, dealing with people rather than things), Interest 4/9 (.34, preference for nonsocial rather than social activities), and Interest 5/0 (-.26, activities resulting in tangible, productive satisfaction rather than esteem). The reinforcer is negatively correlated with education and self-direction, two characteristics which are highly related to pay (see Table 6). In addition, eight other reinforcers correlate more highly with pay. Despite any weaknesses the measure of pay may have, the overall patterns of correlation suggest that the variable pay is clearly more valid than is the reinforcer "paid well." If anything, this reinforcer appears to measure something like "not dealing with people."

If the reinforcer "paid well" is reinterpreted, these correlations make more sense. One might suppose that respondents say they are paid well relative to other workers when they are paid well relative to other workers of their own kind (e.g. of similar age or education). This hypothesis was tested by calculating the partial correlation of "paid well" with pay

holding education constant. It was assumed that one would feel well paid if one earned more than workers with an equivalent education. The partial correlation is .47, considerably higher than the original .28. This is understandable because people in social service jobs (which correlated negatively with "paid well") are paid less than other workers with equivalent education (see Gottfredson, 1978a). Even granted this reinterpretation, however, other reinforcers such as "plan work with little supervision" still correlate more highly with pay. Also, this reinterpretation means that the reinforcer does not measure what it was intended to--the absolute level of reinforcement relative to other occupations.

Correlations with other reinforcers. Although several reinforcers show evidence of validity, "paid well" and several reinforcers below it in Table 5 show no such evidence of validity. "Having steady employment" is not correlated with any of the variables it should be correlated with--pay, education, or prestige. Although one could argue that bosses train and back up their men better in low-paying, low-education, and low-prestige jobs, this is contrary to expectation. It is also unlikely that companies administer their policies more fairly with lower-level workers. The foregoing four reinforcers appear to be highest in repetitive work (Temperament 2) allowing little self-direction (self-direction) or independent judgment (Temperament 3) or planning and direction of activities (the absence of Temperament 4). These criticisms are consistent with the earlier discussion about implausible correlations with prestige.

The problem appears to stem from the ipsative nature of the reinforcer scores. The reinforcers low on the list are most descriptive of low-level jobs (i.e. they are negatively related to prestige). What is distinctive within these occupations may not characterize well their relative standing

among occupations.

Validity coefficients of unadjusted scores. The adjusted scores are supposed to be more valid for measuring absolute levels of reinforcers than are the unadjusted scores. Table 7 for unadjusted scores suggests that this is not the case. Although correlations differ between Tables 5 and 7, the patterns of correlations in Table 7 suggest the same conclusions as do those in Table 5 about the validity or invalidity of the individual reinforcers. Overall, the correlations for the unadjusted scores appear to be as useful as those for the adjusted scores. This conclusion is reached by calculating deviations of the underlined validity coefficients from the average row correlations shown in the last columns of Tables 5 and 7 (using z transformations of those correlations). On the average, the validity coefficients exceed the average correlations by similar amounts: .24 for the adjusted and .20 for the unadjusted scores. In this sense both adjusted and unadjusted scores are almost equally valid (or not valid) for measuring absolute levels, thus calling into question the success of the adjustment procedure for obtaining absolute scores.

Insert Table 7 About Here

Discriminant Analyses

The 21 reinforcers were used as the discriminating variables in a discriminant analysis of the eight occupational clusters described earlier. Analyses were performed separately for adjusted and unadjusted scores. In both analyses the first two functions accounted for almost 80% of the between-group variance, so the following discussion will be limited to those two functions. All hypotheses were confirmed.

The discriminant analyses show that both sets of scores are equally useful for distinguishing among occupational clusters. The solutions are

highly similar in several ways. The first discriminant function accounts

for 59% and 53% of the between-group variance, respectively, for the ad-

justed and unadjusted scores. The second discriminant function accounts

for 21% and 24% of the between-group variance. Also, the centroids are

nearly identical across the two analyses on both the first·and second

functions. In other words, when the eight groups are plotted according to

centroids on the first two discriminant functions, their positions in space

are almost identical for the adjusted and unadjusted scores (see Figures

1 and 2).

At the same time, differences appear in the coeffic ents of the dis-

criminant functions, and they illuminate the changes in substantive inter-

pretation that can occur when scores are adjusted. The differences are

best illustrated by referring to Figures 1 and 2. Figure 1 displays the

results for the discriminant analysis using adjusted scores. Figure 2

provides the same summary for unadjusted scores. The eight clusters are

plotted according to their mean scores (centroids) on the first two discrim-

inant functions. The vectors of the 21 reinforcers in this 2-space are

also shown in order to provide a quick impression of how each reinforcer

relates to the discriminant functions and separates the occupational clus-

ters. Although prestige and the neutral point were not used in the calcu-

lations of the discriminant functions, a vector for each is included to

show how they are related to the distinctions among clusters. The direc-

tion of a vector (cosine θ) indicates how that variable is/correlated with

the two functions. The length of a vector indicates how useful that rein-

forcer is for separating the groups (i.e., it is the ratio of between- to

within-group variance for that variable). See Overall and Klett (1972)

for a description of this method of presenting results.

Insert Figures 1 and 2 About Here

Mean prestige of the eight groups is correlated .9 with their cen-

troids on function 1. This is true for both adjusted and unadjusted scores

and is illustrated by the vectors for prestige in Figures 1 and 2. The

first and most important function is the prestige-related dimension. The

(reflected) neutral point is also correlated .9 with the first function.

Although the groups are positioned almost identically in space in the

two figures, the patterns of vectors are different. These vectors simply

illustrate in a more dramatic way the differences between the standardized

discriminant function coefficients (not shown here) for the two s of

data. One difference between Figures 1 and 2 is that more vectors are

positive along the first function for the adjusted scores than for the

unadjusted. This occurs because all reinforcers become more positively

correlated with prestige (which as noted above is correlated .9 with the

first function) when scores are adjusted. A second difference is that the

relative importance of different reinforcers for separating the groups

shifts dramatically. For example, the vectors for "try out own ideas"

and "use individual abilities" are much longer in Figure 1 but the vectors

for "friendly coworkers" and "do things for people" are much shorter than

in Figure 2.

The reinforcers which best differentiate the groups in Figure 1 are

"do things for people" and the five reinforcers which load heavily on

Function 1--"try out own ideas," "use individual abilities," "make decisions

on own," "plan work with little supervision," and "feeling of accomplishment." The latter five are the five reinforcers most positively correlated with prestige. In Figure 2 the most useful reinforcers for discriminating among the groups are "do things for people," the three reinforcers with the highest positive correlations with prestige ("try out own ideas," "use individual abilities," and "make decisions on own"), and three of the four reinforcers with the highest negative correlations with prestige ("friendly coworkers," "bosses train men well," and "fairness of company policies"). As predicted, Function 1 is unipolar with adjusted scores and bipolar with unadjusted scores.

The interpretation of Figure 2 for unadjusted scores is limited but fairly straightforward. For example, "friendly coworkers" and "doing things for people" are the most distinctive reinforcers within Cluster 4 whereas the prestige-related reinforcers are most distinctive within Cluster 7. Because the scores are ipsative, what is distinctive within an occupation may not be particularly outstanding in absolute terms when all occupations are considered. If 19 reinforcers are practically absent in a particular occupation, the remaining two are by default distinctive. Turning to the vector for the neutral point and prestige level, we see that the number of reinforcers present in an occupation (the reflected neutral point) is strongly related to the general desirability (prestige) of an occupation. It is also clear that the major dimension discriminating among the occupational groups (given these particular 21 reinforcers) is a prestige dimension. We can also see which particular reinforcers are most highly related to this dimension, meaning that when these reinforcers are present in an occupation that occupation generally has many reinforcers. This observation must be

tempered with the knowledge that some of the reinforcers may not be distinct

reinforcers at all (as was illustrated earlier by their extremely high

intercorrelations).

Figure 1 and Figure 2 differ, but the important question is whether or

not Figure 1 with adjusted scores tells us anything that Figure 2 with unad-

justed scores does not. The distinctive features of Figure 1 were predicted

from insights with the unadjusted scores, so these distinctive features

cannot be expected to provide us new or different information. What is

more likely is that Figure 1 actually obscures what can be learned because

two types of information (unadjusted scores and neutral points) that were

kept separate in the analysis for Figure 2 were combined in the analysis for

Figure 1. In short, not only are adjusted scores no more valid than the

unadjusted for measuring absolute levels of reinforcement, but they may

even be less interpretable.

Discussion

This study is the first to validate occupational reinforcer patterns

scores against external measures of the same or similar reinforcer constructs.

Seven of the 21 reinforcers were compared to data on occupations from the

U.S. Bureau of the Census and the U.S. Department of Labor. The major

limitations of the study are as follows: (a) Only seven reinforcers are

examined in detail. (b) Some of the criteria against which the reinforcers

were validated are themselves of uncertain validity. (c) The occupations

for which the validation criteria are available are not exactly the same as

those for which occupational reinforcer patterns data are available. Never-

theless, the results lead to clear conclusions about the validity of the

adjusted scores for measuring the absolute level of reinforcers.

Conclusions About Validity

First, reinforcers having substantial positive correlations with prestige--such as "make decisions on own" and "try out own ideas"--show evidence of construct validity when tested against external criteria, although they all largely measure the same thing. Some reinforcers negatively correlated with prestige--such as "fairness of company policies" and "bosses back up men"--could not be examined in detail for lack of validation criteria, but implausible correlations suggest that they are not valid for measuring absolute levels of reinforcement. The results show that the reinforcer "paid well relative to other workers" is not a valid measure of relative pay.

Second, although the adjusted scores are supposed to be more valid for measuring absolute levels than are the unadjusted scores, they are not. Validity coefficients show that both sets are equally useful (or not useful) for measuring absolute levels of reinforcement. Both sets of scores also differentiate groups of occupations equally well in the discriminant analyses.

Third, knowledge of the unadjusted scores and neutral points is sufficient to predict the message that a discriminate analysis of adjusted scores will give us. The analysis of adjusted scores fails to provide any new information.

Recommendations for Research and Practice

Both adjusted and unadjusted scores produce the same profiles. This paper did not examine the validity of the scales for constructing occupational profiles nor for using them to create an occupational classification. But whatever the validity of the profiles, it is the same for the adjusted and unadjusted scores. Only the adjusted scores are designed to measure level of the profiles. This paper has shown them to be of questionable

validity for measuring absolute levels of reinforcers. Therefore, at least
those uses that take level of profiles into account must be carefully re-
examined.

Of the uses recommended by Rosen et al. (1972) and Borgen et al. (1972),
the following deal with profile shape only and are not, therefore, necessarily
problematic: visually matching profiles of counselee needs with the rein-
forcers present in various work environments, identifying occupations with
similar reinforcer patterns, and listing which reinforcers are most and
least distinctive within different occupations. All interpretations should
of course be made with the clear awareness that what is distinctive is not
necessarily plentiful. The computer scoring service for the Minnesota Impor-
tance Questionnaire (MIQ) uses D^2 to match ORP profiles with the needs pro-
files of counselees (Gay et al., 1971). D^2 is the sum of squared differences
between an individual's Minnesota Importancè Questionnaire (needs) adjusted
scale values and the corresponding adjusted scale values for the ORP of a
specific occupation. Although D^2 is affected by profile elevation, its
use may not be problematic because the MIQ needs scores are adjusted (ele-
vated) by the same procedure as are the ORP scores.

Other recommended uses that take profile level into account should be
re-examined. Ranking scale values for single scales is recommended (Rosen,
et al., 1972:p. 15; Borgen et al., 1972:p. 14) when counselors have infor-
mation only about what the counselee's most important need is. If that
primary need were pay, for example, the counselee would be better served by
providing census data or other sources of data about pay than by examining
the invalid "paid well relative to other workers"; reinforcer scale values.
A related questionable practice is to interpret mean scale differences
among occupational groups as absolute differences in reinforcement levels.

For example, the factors in Tinsley and Weiss's (1974) investigation of
the reinforcer structure of occupations need to be interpreted differently.[2]
This caution would apply to using reinforcer means to interpret any
classification of occupations.

One final recommendation is to investigate why the scaling procedure
failed to produce absolute scores comparable across occupations. The
problem may be that Thurstone's law of comparative judgment was inappro-
priately applied to this scaling task. Although no mention is made of
whether or not necessary assumptions are met (e.g., homogeneity of variance)
or anchoring effects are present, the discussion will focus on more basic
potential problems. The adjusted scores were derived in two steps: (a) an
interval scale was created separately for each occupation, and (b) a zero
(neutral) point was created for each occupation and the scale adjusted by
the relevant neutral point. These two steps created 148 scales (one for
each occupation), each with a neutral point indicating which reinforcers
are present or absent. The second step was carried out in order to provide
measures of absolute levels of reinforcement and so allow interoccupational
comparisons of those absolute levels. However, one further step is necessary
to make such comparisons. One must assume (because it is not demonstrated)
that the 148 scales actually represent only a single common scale, for
example, that the 148 scores for a particular reinforcer themselves form a
good scale. To do this one must assume both that the neutral points are
comparable across all 148 scales and that the scale intervals are the same
across all scales. These assumptions are unjustified until supported by
evidence about the relation of the 148 scales to each other or to a common
standard.

One important difference between the ORP procedure and that of typical judgment tasks may provide another related clue to the failure of the OR' method. The occupations are analogous to subjects in a judgment task; tie raters are analogous to repeated trials by the subject. The reinforcer items are analogous to stimulus objects, but with one crucial difference. Stimulus objects are typically constants (a 10-pound weight is always a 10-pound wieght). But the stimulus objects in the ORP problem are variables. In fact, the goal of the scaling procedure is to assign values to those variables. In short, the ORP scaling problem involves a 3-dimensional matrix to which a 2-dimensional method was applied. The shift in emphasis may be better illustrated by modifying a more typical scaling problem to resemble the task of the ORP analysis. The vegetable-rating task used by Borgen et al. (1968) to explain their adjustment procedure will illustrate the additional scaling demand posed by the ORP task. Imagine 148 subjects ranking the size of 21 vegetables. But the vegetables being rated are of varying sizes. Subject A is always exposed to a large tomato and a tiny cucumber: Subject B always gets a small tomato and a moderately-sized cucumber; and so on. The task for the investigator is then to take the 148 sets of rankings and calculate the size of the individual vegetables to which each subject was exposed, e.g., who got the largest tomato. It is not clear that the intervals of the scales (adjusted or unadjusted) have anything to do with the intervals that might be obtained if a single subject were to rank all the tomatoes.

In conclusion, readers are reminded that this paper has questioned the validity of only one assumption about the ORP scores--the assumption that inferences about absolute levels of reinforcement can be drawn from adjusted

reinforcer scales. Although only weakly validated, the <u>unadjusted</u> scores

and the neutral points provide interesting and intelligible information

about occupational reinforcers. This information should be exploited more

fully, not only to show how reinforcers are related but also to better adapt

the ORP profiles for practical application. Other ways of providing scores

comparable across occupations should be investigated. Earlier alternatives

that were abandoned because of their cumbersome nature (see Borgen et al.,

1968:pp. 4-6) should be reexamined. But the applicability of any potential

scaling method to the special features of the ORP scaling task must be care-

fully assessed and veridical comparisons made where possible to validate

resulting scales.

Footnotes

1. A number of the interests and temperaments in the DOT estimates are only rarely rated as present. The distributions of these variables are described by the Committee on Occupational Classification and Analysis (in press).

2. In that paper, Tinsley and Weiss (1974) describe eight occupational clusters in terms of mean factor scores on five factors derived from the 21 adjusted reinforcers. Those five factors and the reinforcers which load most highly on each are (a) creative responsible achievement ("use abilities," "feeling of accomplishment," "try out own ideas," and "make decisions on own"), (b) benevolent supervision ("fairness of company policies," "bosses back up men," and "bosses train men well"), (c) service ("do things for people"), (d) work alone ("work alone"), and (e) steady comfortable employment ("have steady employment" and "good working conditions"). Problems with assuming (as Tinsley and Weiss do) that these factors reflect absolute levels of reinforcement will be illustrated with the first 2 factors. The first factor is defined primarily by the four reinforcers with the highest positive correlations with prestige; the second factor by the three reinforcers with the highest negative correlations with prestige. If the factor scores are interpreted as absolute levels, the first factor makes sense but the second does not. Clusters III and VI are singled out here because the former has the next to the highest Factor I mean score and the lowest Factor II mean score; the latter cluster has the lowest Factor I but the highest Factor II mean scores. Cluster III is called creative/independent/ altruism and includes, for example, case-worker, teacher, architect,

newspaper publisher, and interior designer; Cluster VI is labelled rou-
tine/supervised/non-service/teamwork and includes, for example, assembler,
meat cutter, pilot, bookbinder, cashier, postal clerk, and punch press
operator. The positions of the two clusters on Factor I are sensible,
but it is doubtful that the first group has the least benevolent and
the second the most benevolent supervision of all occupational clusters.
What is more probable is that benevolent supervision is more salient
in the latter. The titles of the clusters themselves suggest this.
Cluster III receives little supervision in contrast to Cluster VI.
Similar objections could be raised with Factor V (steady, comfortable
employment).

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Table 1

Correlations Among Occupational Reinforcer Pattern Scales, Neutral Point,.
and Prestige for both Adjusted and Unadjusted Scales[a]
(N = 148 Occupations)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Neut.[b] Pt.	Pres.
1 Own Decisions	(.95)	.87	.84	.71	.88	.54	.34	.45	.34	.65	.45	.08	.42	-.09	.00	.04	.14	-.24	-.16	.01	-.15	.78	.60
2 Own Ideas	.78	(.95)	.92	.76	.75	.44	.30	.39	.24	.66	.55	.04	.33	-.18	.00	.07	.07	-.35	-.21	.01	-.14	.74	.57
3 Use Ability	.71	.85	(.93)	.85	.70	.48	.38	.38	.18	.67	.65	.22	.31	-.20	.03	.08	.03	-.36	-.11	.05	-.11	.78	.58
4 Accomplishments	.40	.53	.67	(.85)	.57	.58	.35	.39	.29	.59	.66	.22	.12	-.17	.06	.06	.12	-.26	-.07	.01	-.13	.72	.61
5 Supervision	.75	.55	.44	.24	(.87)	.43	.28	.43	.39	.52	.34	.04	.45	-.01	.03	.08	.14	-.16	-.24	-.00	-.12	.65	.60
6 Be Somebody	.18	.06	.09	.31	.10	(.85)	.32	.26	.37	.36	.41	.21	.16	.06	.22	-.09	.32	.03	-.07	.04	.01	.57	.51
*7 Opportunities	-.04	-.08	.02	-.01	-.06	.05	(.90)	.33	-.01	.15	.56	.23	-.03	.20	.31	-.01	-.07	-.16	.39	.32	.14	.51	.38
8 Tell Others	.14	.08	.03	.12	.21	.04	.15	(.86)	-.01	.29	.22	.08	-.17	-.14	-.11	.22	-.08	-.11	-.06	.05	-.12	.40	.39
9 Things for Others	.11	-.01	-.12	.09	.25	.24	-.20	-.14	(.93)	.25	.05	-.40	.12	.10	-.11	-.12	.49	.34	-.22	-.15	-.16	.30	.29
10 Work Differs	.38	.41	.41	.30	.23	.04	-.22	.05	.07	(.88)	.40	.08	.21	-.18	-.19	.13	.07	-.16	-.24	-.02	-.11	.61	.30
11 Recognition	-.17	.07	.21	.31	-.20	.03	.34	-.07	-.23	-.03	(.71)	.37	.13	-.10	.30	.10	-.01	-.30	.35	.48	.34	.68	.24
12 Paid Well	-.27	-.29	-.08	-.01	-.22	.07	.10	-.01	-.51	-.14	.27	(.90)	.06	-.18	.15	.04	-.24	-.29	.30	.32	.33	.27	.04
13 Work Alone	.14	.04	.01	-.18	.30	-.01	-.22	-.28	.05	.01	-.09	.03	(.86)	.15	.25	.08	.05	-.21	-.08	-.00	.03	.28	.06
14 Steady Work	-.34	-.42	-.48	-.36	-.11	.03	.17	-.11	.11	-.29	-.14	-.11	.23	(.92)	.47	-.00	.06	.16	.21	.12	.10	.27	-.03
15 Working Conditions	-.51	-.47	-.47	-.30	-.29	.04	.14	-.19	.04	-.51	.13	.13	.25	.56	(.76)	.00	-.01	.07	.35	.20	.27	.30	.10
16 Busy	-.15	-.29	-.29	-.20	-.14	-.24	-.14	.20	-.15	-.04	-.03	.07	.13	.15	.11	(.81)	-.07	-.06	.07	.07	.09	.19	.05
17 Work not Immoral	-.13	-.16	-.42	-.15	-.10	.18	-.18	-.02	.39	-.12	-.10	-.10	.16	.29	.22	.21	(.64)	.33	-.11	-.03	.09	.15	.16
18 Co-workers	-.50	-.56	-.58	-.30	-.19	.07	-.10	.09	.30	-.15	-.12	.00	.09	.39	.39	.33	.70	(.74)	-.02	-.07	-.02	-.19	-.09
19 Bosses Train	-.60	-.61	-.53	-.35	-.50	-.20	.28	-.06	-.22	-.45	.31	.32	.00	.35	.45	.24	.23	.39	(.79)	.72	.61	.16	-.25
20 Bosses Back Up	-.52	-.47	-.46	-.38	-.34	-.16	.14	-.02	-.22	-.30	.36	.31	.02	.26	.28	.20	.25	.35	.77	(.72)	.84	.30	-.20
21 Fair Policies	-.58	-.51	-.53	-.42	-.36	-.11	.03	-.12	-.17	-.30	.29	.35	.10	.26	.38	.25	.36	.39	.69	.87	(.79)	.17	-.28
Neutral Point[b]	.53	.49	.50	.24	.20	.04	.07	-.13	-.06	.15	-.27	-.18	-.24	-.37	-.39	-.43	-.66	-.81	-.47	-.45	-.47	--	.50
Prestige	.55	.51	.51	.47	.45	.30	.18	.14	.12	.07	-.16	-.19	-.20	-.23	-.25	-.26	-.27	-.40	-.53	-.55	-.56	.50	--

[a] Correlations among adjusted scales are above the diagonal, correlations among unadjusted scales are below the diagonal,
and correlations among analogous adjusted and unadjusted scales are in the diagonal in parentheses.

[b] As noted in the text, the sign of the neutral point has been reversed.

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Table 2

The Relation of the 21 Reinforcers to Occupational Prestige Level, Reinforcer Variances, and Omegas Squared with 17 Categories of Work
(N = 148 Occupations)

Reinforcers	Correlation of Scores with Prestige		Variance		Omegas Squared for 17 categories of Work	
	Unadjusted (1)	Adjusted (2)	Unadjusted (3)	Adjusted (4)	Unadjusted (5)	Adjusted (6)
Make decisions on own	.55	.60	.14	.25	.37**	.43**
Try out own ideas	.51	.57	.17	.28	.45**	.47**
Use individual abilities	.51	.58	.11	.21	.40**	.43**
Feeling of accomplishment	.47	.61	.06	.12	.36**	.44**
Plan work with little supervision	.45	.60	.09	.15	.25*	.40**
Position of "somebody" in the community	.30	.51	.09	.13	.22	.38**
Opportunities for advancement	.18	.38	.14	.18	.24*	.28**
Tell others what to do	.14	.39	.12	.13	.28**	.33**
Do things for other people	.12	.29	.25	.28	.39**	.46**
Work is different every day	.07	.30	.10	03	.14	.22
Receive recognition for work	-.16	.24	.04	.07	.21	.19
Paid well relative to other workers	-.19	.04	.17	.18	.25*	.20
Work alone	-.20	.06	.13	.14	.12	.10
Have steady employment	-.23	-.03	.23	.20	.21	.16
Good working conditions	-.25	.10	.08	.07	.18	.15
Busy all the time	-.2?	.05	.10	.09	.23*	.11
Work not morally wrong	-.27	.16	.06	.03	.16	.24
Friendly co-workers	-.40	-.09	.08	.03	.22	.18
Bosses train their men well	-.53	-.25	.09	.08	.34**	.14
Bosses back up their men	-.55	-.20	.07	.06	.39**	.14
Company administers policies fairly	-.56	-.28	.09	.07	.40**	.23*

[a] The 17 categories of work were constructed from Holland's (1973) 6 categories of work and 3 broad prestige levels, where one of the possible 18 cells was vacant.

[b] The changes in variance when scores are adjusted (column 4 minus column 3) and the correlations between the unadjusted scores and occupational prestige (column 1) are correlated .89.

p < .01; ** p < .001   Source: Gottfredson (1978b).

Table 3

Validation Criteria for Eight Reinforcer Scales
and Predicted Direction of Correlation for Adjusted Scores

Prediction No.	Reinforcer	Validation Criterion	Direction of Correlation
1	Make decisions on own	Self-direction	+
2	" " " "	Situations involving doing things only under specific instruction, allowing little or no room for independent action or judgment (Temperament 3)	–
3	Try out own ideas	Self-direction	+
4	" " " "	Situations involving a preference for activities of a routine, concrete, organized nature vs. those of an abstract and creative nature (Interest 3 vs 8)[a]	+
5	Position of "somebody" in the community	Prestige	+
6	" " "	Situations involving a preference for activities resulting in prestige or the esteem of others vs. tangible, productive satisfaction (Interest 5 vs 0)[a]	–
7	Tell others what to do	Situations involving the direction, control and planning of an entire activity or the activities of others (Temperament 4)	+
8	Do things for other people	Situations involving a preference for working for people for their presumed good, as in the social welfare sense, or for dealing with people and language in social situations vs. activities that are nonsocial in nature, and are carried on in relation to processes, machines and techniques (Interest 4 vs 9)[a]	–
9	Work is different every day	Situations involving a variety of duties often characterized by frequent change (Temperament 1)	+
10	Paid well relative to other workers	Median income of males	+
11	Work alone	Situations involving working alone and apart in physical isolation from others, although the activity may be integrated with that of others (Temperament 6)	+

[a]The first interest of a pair is scored low; the second of a pair is scored high.

Note. See text for the definitions and sources of the validation criteria.

Table 4

DOT Temperament and Interest Items

<table>
<tr><td colspan="3" align="center">Temperaments[a]</td></tr>
</table>

1. Situations involving a variety of duties often characterized by frequent change.

2. Situations involving repetitive or short cycle operations carried out according to set procedures or sequences.

3. Situations involving doing things only under specific instruction, allowing little or no room for independent action or judgment in working out job problems.

4. Situations involving the direction, control, and planning of an entire activity or the activities of others.

5. Situations involving the necessity of dealing with people in actual job duties beyond giving and receiving instructions.

6. Situations involving working alone and apart in physical isolation from others, although the activity may be integrated with that of others.

7. Situations involving influencing other people in their opinions, attitudes, or judgments about ideas or things.

8. Situations involving performing adequately under stress when confronted with the critical or unexpected or when taking risks.

I. Situations involving the evaluation (arriving at generalizations, judgments, or decisions) of information against sensory or judgmental criteria.

0. Situations involving the evaluation (arriving at generalizations, judgments, or decisions) of informations against measurable or verifiable criteria.

X. Situations involving the interpretation of feelings, ideas or facts in terms of personal viewpoint.

Y. Situations involving the precise attainment of set limits, tolerances, or standards.

<table>
<tr><td colspan="3" align="center">Interests[b]</td></tr>
</table>

1. Situations involving a preference for activities dealing with things and objects.   vs.   6. Situations involving a preference for activities concerned with people and the communication of ideas.

2. Situations involving a preference for activities involving business contact with people.   vs.   7. Situations involving a preference for activities of a scientific and technical nature.

3. Situations involving a preference for activities of a routine, concrete, organized nature.   vs.   8. Situations involving a preference for activities of an abstract and creative nature.

4. Situations involving a preference for working for people for their presumed good, as in the social welfare sense, or in dealing with people and language in social situations.   vs.   9. Situations involving a preference for activities that are nonsocial in nature, and are carried on in relation to processes, machines, and techniques.

5. Situations involving a preference for activities resulting in prestige or the esteem of others.   vs.   0. Situations involving a preference for activities resulting in a tangible, productive satisfaction.

[a] Temperaments were coded as 1 if present, 0 if absent.

[b] Interests were coded as 1 if the first half of the item applied, 3 if the second half applied, and 2 if neither pole of the item applied.

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Table 5

Correlations of Adjusted Reinforcer Scores with
DOT Temperaments, DOT Interests, and Other Job Characteristics
(N = 148 occupations)

Reinforcer	Pay[a]	Years[a] Educ.	Pres-tige	Self Dir.	Temperaments[b] 1	2	3	4	5	7	8	9	0	X	Y	Interests 1/6	2/7	3/8	4/9	5/0	Average[c] Row Correlation
Own Decision	.50	.56	.60	.64	-.02	-.54	-.37	.52	.24	.29	-.05	.43	.29	.16	-.25	.41	.11	.61	-.26	-.33	.36
Own Ideas	.42	.54	.57	.59	-.03	-.49	-.35	.52	.17	.35	-.12	.46	.25	.29	-.23	.42	.23	.66	-.30	-.30	.34
Use Abilities	.47	.50	.58	.55	-.01	-.50	-.37	.45	.10	.31	-.13	.39	.29	.25	-.14	.33	.25	.65	-.20	-.19	.34
Accomplishment	.47	.50	.61	.55	.01	-.49	.35	.35	.09	.22	-.06	.34	.29	.22	-.07	.28	.34	.60	-.25	-.19	.33
Supervision	.44	.59	.60	.63	.00	-.42	-.18	.52	.22	.25	-.12	.34	.20	.08	-.23	.43	.13	.45	-.33	-.39	.34
Be Somebody	.50	.48	.51	.49	-.18	-.26	-.22	.29	.21	.30	-.10	.19	.08	.12	-.15	.22	.10	.29	-.18	-.32	.25
Opportunities	.41	.32	.38	.29	-.14	-.06	-.07	.20	-.16	.04	-.17	.02	.11	.01	-.03	.07	.17	.11	.04	-.08	.15
Tell Others	.37	.30	.39	.26	.18	-.26	-.16	.41	-.13	-.08	-.19	.00	.33	-.02	.10	-.03	.36	.27	-.06	-.07	.19
Things for Others	-.03	.44	.29	.56	-.16	-.27	-.08	.29	.62	.14	.20	.30	-.16	.08	-.45	.47	-.12	.19	-.61	-.52	.29
Work Differs	.23	.26	.30	.32	.06	-.43	-.29	.27	.06	.18	.01	.29	.27	.17	-.04	.24	.10	.49	-.10	-.09	.21
Recognition	.21	.20	.24	.27	-.03	-.22	-.11	.13	.04	.27	-.11	.32	.03	.22	-.13	.24	.06	.28	-.10	-.09	.17
Paid Well	.28	-.12	.04	-.17	.04	.08	-.01	-.20	-.25	.08	-.21	-.07	.13	-.05	.19	-.24	.00	-.04	.34	.26	.13
Work Alone	.05	.05	.06	.15	-.01	-.11	-.07	-.01	.09	.11	-.01	.16	.01	.24	-.09	.18	-.20	.15	.06	-.10	.10
Steady Work	-.07	.01	-.03	-.02	-.13	.12	.04	-.19	.00	-.09	.06	-.28	-.12	-.12	.11	-.08	-.08	-.20	.04	.02	.09
Working Conditions	.05	.11	.10	.10	-.09	.00	.01	-.21	.11	.09	-.10	-.10	-.13	.10	-.08	.09	-.11	-.07	-.05	-.07	.09
Busy	-.04	.00	.05	.00	.15	.01	-.04	.08	-.15	-.10	-.09	-.03	.13	-.22	.23	-.02	.15	.00	-.04	.03	.08
Work Not Immoral	.02	.27	.16	.31	-.14	-.18	-.07	.13	.39	.10	.13	.18	-.12	.08	-.24	.29	-.13	.12	-.32	-.33	.19
Co-workers	-.22	.01	-.09	-.01	-.06	-.05	.18	-.12	.23	-.10	.07	-.16	-.20	-.10	-.06	.00	-.16	-.19	-.17	-.07	.11
Bosses Train	-.16	-.32	-.25	-.29	-.03	.16	.08	-.31	-.19	-.04	.03	-.18	-.10	-.09	.13	-.25	-.16	-.24	.29	.28	.18
Bosses Back Up	-.19	-.19	-.20	-.17	.04	.11	.12	-.06	-.08	.07	-.03	-.01	-.08	-.15	.02	-.13	-.12	-.16	.14	.09	.11
Fair Policies	-.23	-.26	-.28	-.23	.00	.24	.18	-.17	.01	.11	.03	-.04	-.23	-.12	-.04	-.09	-.27	-.29	.10	.07	.15

Note: Underlining indicates correlations for which predictions were made in Table 3.

[a] Refers to male experienced civilian labor force.

[b] Temperament 6 is excluded because all 148 occupations were coded 0 for this temperament.

[c] Average correlation of the reinforcer with all criteria except for the validation criteria for that particular reinforcer. Averages are calculated with z transformations of the absolute values of the correlations.

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Table 6

Correlations Among DOT Temperaments, DOT Interests, and other Job Characteristics
(N = 148 occupations)

	Pay[a]	Educ[a]	Pres	Self	1	2	3	4	5	7	8	9	0	x	y	1/6	2/7	3/8	4/9
Education	.64																		
Prestige	.81	.90																	
Self-Direction	.51	.84	.81																
Temperaments[b]																			
1	-.11	-.17	-.11	-.17															
2	-.27	-.38	-.44	-.55	-.19														
3	-.24	-.24	-.33	-.29	-.15	.42													
4	.42	.67	.61	.59	-.01	-.26	-.20												
5	-.10	.30	.12	.51	-.11	-.25	-.17	.23											
7	.19	.20	.19	.37	-.13	-.19	-.15	.15	.46										
8	-.07	-.02	-.05	.03	-.06	-.09	-.07	.13	.21	-.06									
9	.12	.33	.26	.47	.24	-.42	-.33	.37	.48	.46	.21								
0	.28	.16	.27	.08	.26	-.50	-.39	.14	-.37	.17	-.16	.02							
x	.01	.00	.02	.03	-.07	-.11	-.09	-.01	.05	.03	-.03	.26	-.19						
y	.03	-.27	-.10	-.42	.11	.16	.00	-.29	-.72	-.40	-.18	-.58	.31	-.23					
Interests																			
1 vs 6	.16	.49	.38	.69	-.10	-.34	-.14	.34	.69	.52	.14	.60	-.27	.21	-.65				
2 vs 7	.38	.33	.41	.08	-.03	-.04	-.06	.28	-.54	-.28	-.22	-.27	.39	-.12	.48	-.33			
3 vs 8	.42	.48	.54	.50	.02	-.68	-.53	.43	.12	.15	.05	.43	.39	.34	-.12	.34	.25		
4 vs 9	-.12	-.58	-.42	-.66	.24	.23	-.06	-.45	-.68	-.32	-.21	-.39	.30	.04	.60	-.70	.03	-.23	
5 vs 0	-.22	-.59	-.44	-.65	.24	.09	-.15	-.56	-.64	-.30	-.19	-.41	.32	-.07	.65	-.66	.14	-.11	.74

[a] Refers to male experienced civilian labor force.

[b] Temperament 6 is excluded because all 148 occupations were coded 0 for this temperament.

Table 7

Correlations of Unadjusted Reinforcer Scores with
DOT Temperaments, DOT Interests, and Other Job Characteristics
(N = 148 occupations)

Reinforcer	Pay [a]	Years [a] Educ.	Pres-tige	Self Dir.	Temperaments [b] 1	2	3	4	5	7	8	9	0	X	Y	Interests 1/6	2/7	3/8	4/9	5/0	Average [c] Row Correlation
Own Decisions	.49	.53	.55	.61	-.01	-.51	-.34	.53	.22	.26	-.03	.42	.29	.15	-.24	.40	.08	.59	-.23	-.33	.34
Own Ideas	.37	.49	.51	.54	-.02	-.43	-.31	.51	.13	.33	-.12	.46	.23	.32	-.21	.41	.23	.65	-.28	-.28	.32
Use Abilities	.44	.43	.51	.48	.02	-.44	-.34	.43	.04	.28	-.13	.36	.30	.27	-.08	.29	.27	.64	-.15	-.13	.31
Accomplishment	.37	.36	.47	.38	.04	-.36	-.25	.24	-.01	.11	-.01	.25	.26	.20	.05	.17	.37	.50	-.18	-.08	.24
Supervision	.33	.48	.46	.50	.02	-.27	-.03	.46	.17	.15	-.10	.25	.14	.02	-.18	.37	.08	.30	-.28	-.35	.24
Be Somebody	.37	.30	.30	.28	-.19	-.04	-.06	.14	.13	.20	-.06	.03	-.02	.06	-.06	.08	.04	.06	-.07	-.24	.12
Opportunities	.29	.14	.18	.08	-.14	.15	.09	.06	-.28	-.09	-.15	-.14	.03	-.06	.06	-.07	.13	-.10	.17	.02	.12
Tell Others	.19	.07	.14	.00	.22	-.05	.01	.25	-.24	-.23	-.15	-.17	.26	-.10	.21	-.19	.31	.04	.07	.06	.14
Things for Others	-.17	.30	.12	.40	-.17	-.12	.04	.17	.58	.05	.24	.20	-.23	.03	-.40	.39	-.17	.03	-.56	-.46	.23
Work Differs	.06	.06	.07	.10	.11	-.28	-.17	.13	-.03	.06	.06	.18	.22	.13	.05	.12	.04	.34	.01	.03	.11
Recognition	-.07	-.15	-.16	-.11	.00	.10	.15	-.15	-.13	.11	-.07	.14	-.13	.18	.00	.05	-.04	-.04	.08	.11	.10
Paid Well	.12	-.33	-.19	-.40	.06	.27	.14	-.36	-.33	-.04	-.18	-.21	.05	-.11	.27	-.38	-.06	-.24	.46	.38	.24
Work Alone	-.15	-.18	-.20	-.11	.01	.11	.09	-.19	-.01	.00	.03	.01	-.08	.17	.00	.03	-.27	-.08	.18	.02	.10
Steady Work	-.21	-.17	-.23	-.22	-.11	.28	.17	-.31	-.07	-.19	.09	-.38	-.19	-.17	.17	-.19	-.13	-.36	.13	.11	.20
Working Conditions	-.21	-.20	-.25	-.24	-.06	.29	.23	-.44	-.02	-.10	-.04	-.30	-.25	.00	.05	-.11	-.20	-.37	.11	.09	.17
Busy	-.26	-.27	-.26	-.30	.16	.26	.15	-.13	-.24	-.26	-.04	-.21	.01	-.28	.32	-.19	.06	-.26	.10	.16	.20
Work Not Immoral	-.27	-.14	-.27	-.15	-.07	.20	.19	-.17	.15	-.13	.16	-.10	-.23	-.04	-.04	-.01	-.20	-.25	-.07	-.07	.15
Co-workers	-.19	-.30	-.40	-.35	-.01	.26	.32	-.30	.01	-.24	.10	-.31	-.25	-.15	.09	-.19	-.19	-.42	.05	.12	.23
Bosses Train	-.37	-.56	-.53	-.56	.00	.60	.27	-.48	-.28	-.20	.08	-.35	-.20	-.16	.23	-.40	-.22	-.49	.40	.40	.34
Bosses Back Up	-.45	-.51	-.55	-.53	.07	.42	.35	-.30	-.21	.13	.04	-.23	-.21	-.24	.15	-.33	-.21	-.48	.30	.25	.31
Fair Policies	-.44	-.51	-.56	-.52	.03	.48	.36	-.36	-.10	-.07	.08	-.22	-.32	-.19	.08	-.26	-.32	-.53	.23	.21	.31

Note: **Underlining** indicates correlations for which predictions were made in Table 3.

[a] Refers to male experienced civilian labor force.

[b] Temperament 6 is excluded because all 148 occupations were coded 0 for this temperament.

[c] Average correlation of the reinforcer with all criteria except for the validation criteria for that particular reinforcer. Averages were calculated with z transformations of the absolute values of the correlations.

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ERIC

Figure Caption

Figure 1. Centroids of eight occupational clusters on the first and second discriminant functions and the vectors of the 21 reinforcers, prestige, and the neutral point: Adjusted scores

Key to Abbreviations

AC   Accomplishment
BU   Busy
OP   Opportunities
TO   Tell others

Note: Vector length of
"work not immoral" is zero.

FUNCTION II

FUNCTION I

Co-workers
Things for others
Steady work
Work alone
6 Be somebody
Prestige
Supervision
Working conditions
Own decisions
Work differs
Bosses train
BU Recognition
AC
Fair policies
OP
TO
Neutral
Own ideas
Bosses back up
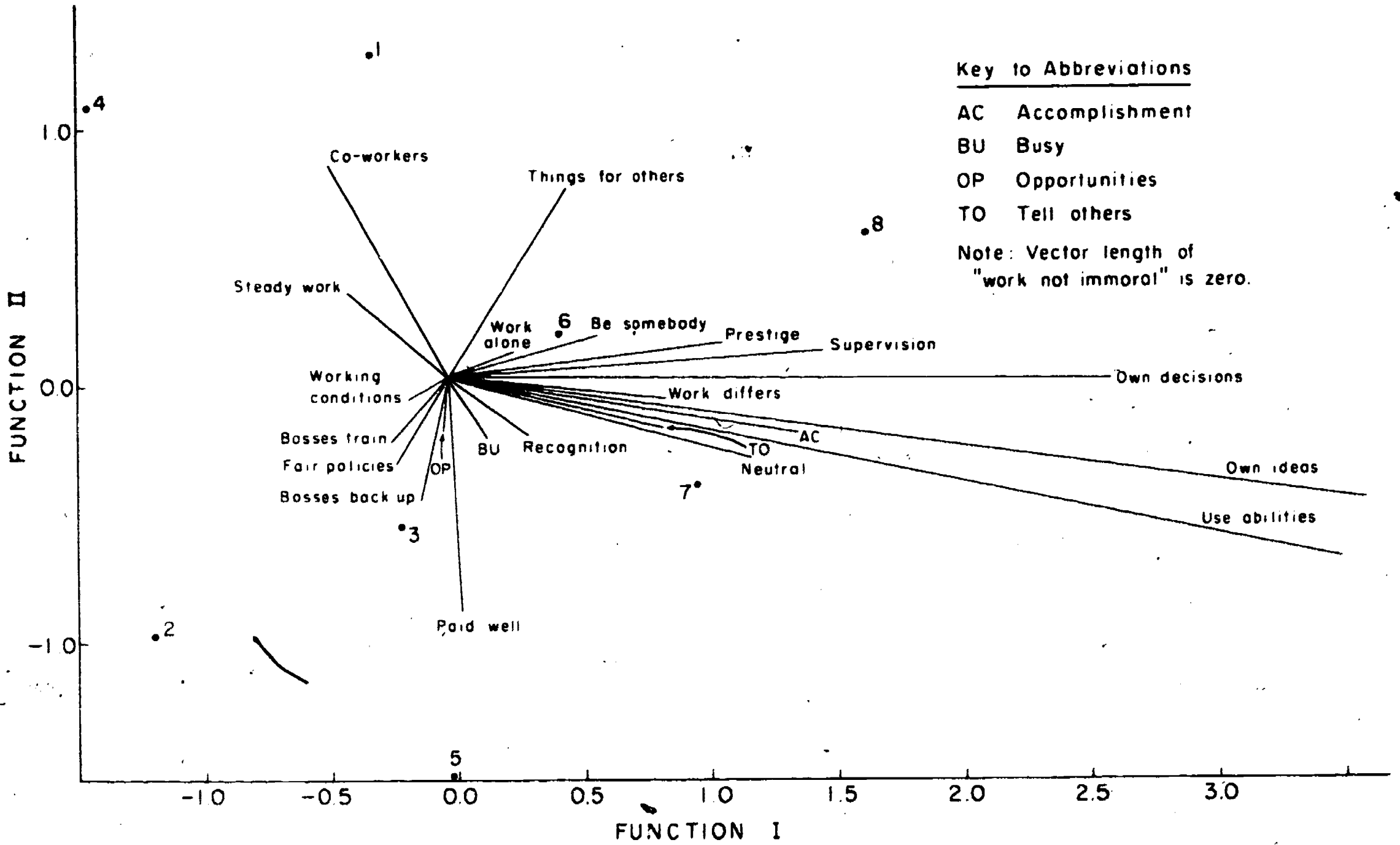Use abilities
Paid well

58
59
47

Figure Caption

Figure 2. Centroids of eight occupational clusters on the first and second discriminant functions and the vectors of the 21 reinforcers, prestige, and the neutral point: Unadjusted scores

Things for others

Key to Abbreviations

AC Accomplishment
BU Busy
OP Opportunities
TO Tell others

FUNCTION II

Co-workers

Steady work

Work not immoral

Be somebody

Working conditions

Work alone

Supervision

Prestige

Own decisions

Bosses train

Work differs

AC

BU

OP

Own ideas

Bosses back up

Recognition

TO

Neutral

Use abilities

Paid well

Fair policies

FUNCTION I